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THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

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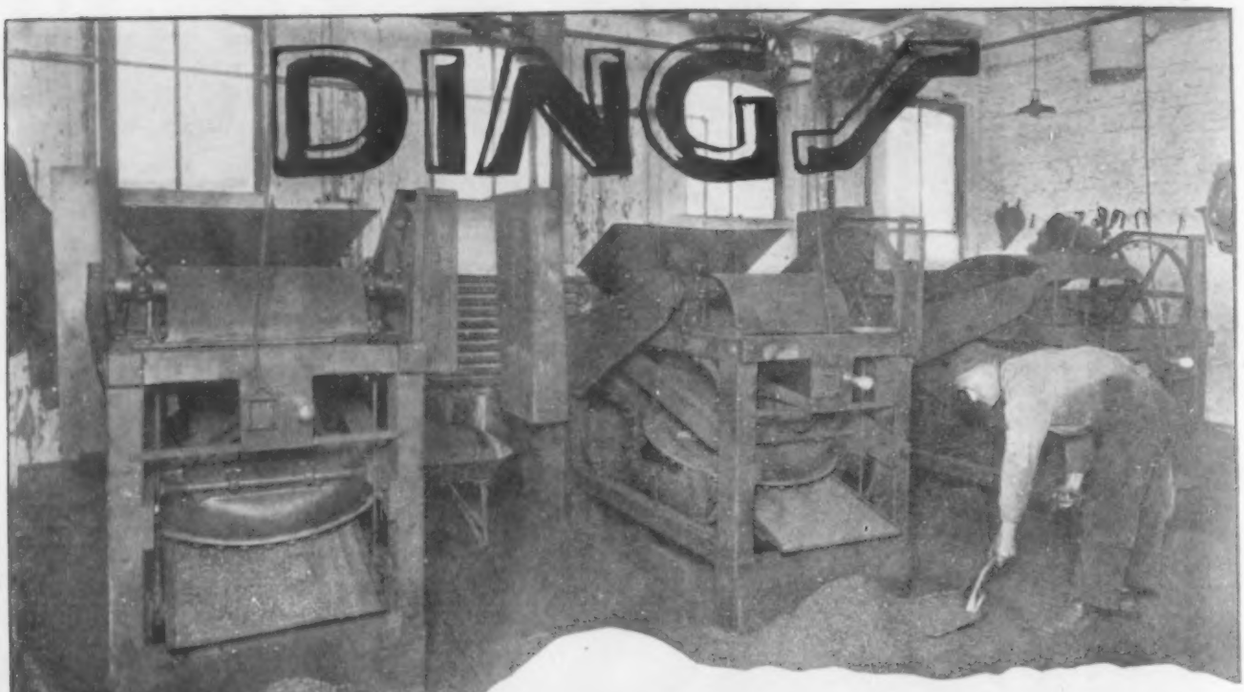

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THE METAL INDUSTRY
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Vol. 18 NEW YORK, SEPTEMBER, 1920 No. 9

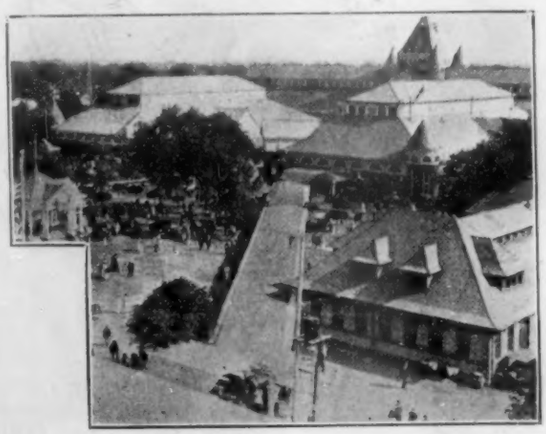
Columbus the Convention City

The 1920 Meeting of the American Foundrymen's Association to be Held Jointly With the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers in Columbus, October 4-8.

Written for The Metal Industry by E. B. DEUTSCH

EARLY HISTORY

From an Indian village to a center of the United States metal industry, the capital of Ohio has a curious and interesting history. The first permanent settlement within the present city limits was little Franklinton, which, in 1803, five years after its establishment, was made the county-seat. In 1810 four citizens of Franklinton formed an association (it is a far cry from those days to the present convention of hundreds of men engaged in the metal industries) to secure the location of the capital on the east bank of the Scioto River. The place was laid out in 1812, while it was yet a forest. In 1834 the Borough of Columbus was made a city, and by



OHIO STATE EXPOSITION GROUNDS.

the close of the same decade the National Road extending from Wheeling to Indianapolis (literally, the Indian city) and passing through Columbus was completed.

According to the census of 1910 the population of this erstwhile forest town had reached 181,511, making it one of the 100 biggest cities. In 1914 its population was 257,000. As a matter of fact, Columbus is the fourth city, industrially, in the Union, and Ohio is the fifth state. More than half the population of the United States resides in a radius, any point of which is not more than eighteen hours by rail from Columbus. If a similar circle were drawn about such important cities as New York, Chicago, Boston, Detroit, etc., it would include from ten to twenty million less population. Columbus is said to have been growing at the rate of 500 people a month for the past twenty years. The reason for this is the same reason which is carrying the readers of METAL INDUSTRY to the convention. Of the 2,500 cities in the United States, Columbus is among the forty leading cities from the standpoint of industrial development. The annual value of its manufactured products is $85,000,000. And its principal industries are, of course, the foundries, machine shops and blast furnaces. The rapid rise of the city was due in part to its railways—from a population of about 700 in 1815 it rose to a population of 42,909 in 1850—but also in large part to the fact that the Ohio coal and iron and petroleum fields are extensive and very rich. It is curious to read a city directory of 1843 and find how rare are foundrymen among the thickly sown clerks and barbers, laborers and carpenters. Today, the foundries are of prime importance.

Changes are obvious too when one contrasts William Dean Howells' picture of the city, when he was a small boy whose father was clerk in the Columbus House of Representatives, with the city in which the 1920 convention is to be held. Howells speaks with a kind of affectionate irony about Neil House, famous as the hostelry at which Dickens stopped in his tour of the States, and which was finished throughout in black walnut—"the wood," remarks Howells, "that came afterward to be so precious for the ugliest furniture ever made." It is not at a Neil House that the delegates will stop to gossip about the differences in castings and the value of new foundry methods. They will miss, of course, certain things that both Dickens and Howells must have enjoyed: there will be no cheerful glass of foaming brew

WHERE THE EXHIBIT WILL BE HELD.

to make talk swifter and easier. But, on the other hand, there will be no black walnut. There is much likelier to be white marble. And the metal industries will be presented in the brass and bronze and aluminum that go toward the perfection of a twentieth-century hotel. The vast furnaces, the speeding elevators, the shining kitchens will all bear evidence to the pride and wealth of Columbians in just these directions.

DEVELOPMENT OF FOUNDRY INDUSTRY

The history of the foundry industry of the city is one of rapid development. It is true Columbus was rather slow in starting the brass, bronze and aluminum foundry business, but it now ranks third in the State of Ohio in the importance and in the value of the product of its foundries, and it has progressed with remarkable speed. For several years prior to 1884 there were some small concerns which carried on brass foundry work, but it was not really until the close of the nineteenth century that the first genuine foundry of real importance was started.

A PART OF THE ATLAS BRASS FOUNDRY, COLUMBUS, OHIO.

In 1884 C. H. Lindenberg, a well-known Columbus citizen, who was interested in the M. C. Lilley Company, started the Columbus Closet Company. The first foundry was set up and operated on Front Street, near Town Street. There the business gradually developed until 1892, when it had grown to such an extent that it was reorganized into the Columbus Brass Company. From that time forward the business was conducted in two foundries, instead of one, one of which was located at 514 Dublin Avenue, and the other on North Fourth Street. In 1913, howver, the two plants were again consolidated on the Dublin Avenue location, where they developed into a large and growing industry. The plant is the largest in Columbus. Its castings are made for all parts of the world. In fact it makes a special and very important department of its export business, which is steadily expanding. The number of employees is about one hundred. The equipment consists of the brass foundry, machine shop and pattern shop, as well as a nickel-plating and polishing department. Power molding machines are operated in the foundry. The machine shop boasts turret lathes, drill presses and milling machines. At present the Columbus Brass Company uses natural gas, in which the city is immensely rich, for fuel. But it expects to install an electric melting furnace next year. Its products are extremely varied, including rough brass and bronze castings, which have won an international reputation, machined parts for the automobile trade, brass railing work and structural brass (alas that the visitors will see no examples of the former in the grill rooms of happier days!), hardware for setting up marble partition work, plumbing material, valves and natural gas goods, and special brass work of all descriptions. The president of the company is C. H. Lindenberg; F. H. Lindenberg is the vice-president; George W. Lindenberg is the secretary and general manager; and C. B. De Lany is the superintendent.

About twenty-seven years after the start of the Columbus Closet Company, some six years before the consolidation of the two foundries of the Columbus Brass Company as it is now known, John Wittman started the Atlas Brass Foundry Company on South Front Street. This company also showed wonderful growth, and has become one of the largest concerns of its kind in the Buckeye capital. It sells its product in every state in the Union, and is now entering upon the export trade. Beginning with a small building used exclusively for foundry work, it has since taken rapid steps in building additions, and today it is considered one of the most progressive factories of its

kind in the country, with a machine shop equipped for production work. The latest addition to the plant is a large modern day-light foundry, to which every attention has been given for the betterment of working conditions, making for perfect light and ventilation, and equipped as well with shower-baths and lockers. All melting of metals and drying of cores is done electrically. An overhead trolley system carries the metal from the electric furnace to each molding floor, and is used in pouring the molds; an equipment which replaces the old undesirable method of carrying the molten metal from furnace to molds in crucibles. Each molder's floor is equipped with roller conveyers, to eliminate carrying the molds from the stack in order to shake out the castings after the metals have been poured. The stock rooms have been removed to the old foundry building, to allow new machinery to be placed in the machine department, increasing the capacity of that branch by 25%. The capacity of the new foundry is approximately eight tons of metal per day, or an increase of 200% over the previous equipment. The products of the company include Atlas bronze geared rotary pumps. Atlas water circulating pumps for Fords, automobile water, oil and air pumps, made to the specifications of the car manufacturers, Atlas bearing bronze, brass, bronze and aluminum castings, production machine and automatic screw machine work.

factures of the latter are electric and water driven pumps, high grade castings in brass and manganese bronze for machine shop and automobile work, aluminum for patterns and all general purposes, and bronze bushings in a general line, from a half to four inches in solids and various size cores from a half to three and a half inches.

The D. A. Ebinger Sanitary Manufacturing Company, which has a show-room in New York and one in Chicago too, is principally interested in sanitation fixtures. Its motto is "Protect the health of your employees and maintain production." Their grey iron foundry is of chief importance, but they have also a small brass foundry making brass parts for their valves and fittings. This normally requires only four or five men, and the amount of metal poured each day depends entirely upon their demands, while the grey iron foundry runs a daily heat of from six to nine tons. The "Ebco" sanitary drinking fountains insure fresh water to every worker, and practical tests taken under actual working conditions have shown that the ice consumption is approximately one pound per capita per day at mid-summer temperature.

The Ohio Pump and Brass Company has been in business some twenty-five years, though it claims to be still a small concern. Its main achievement has been the production of a special bronze, which will resist the action of the various formations of water, and which has been very successful in their hydraulic and electric pumps, and water motors, as well as cocks which they manufacture. Some of their pumps have been in us for eighteen and twenty years, giving daily service, without showing pits or imperfections in the cylinders. It is interesting to learn that they recently repaired the fifth pump they ever made at a cost of about $6, not a single metal part being required. The equipment is modern, within the limitations of a small foundry, and they are beginning to take on outside work of a desirable nature. Their products are "economy products"—and if they fail to interest the visitors in some particulars, they will surely interest the visitors' wives—as, for example, the "Economy Motor Washer" which, it is claimed, banishes washing expense and starts a bank account.

ANOTHER VIEW OF THE ATLAS BRASS FOUNDRY. NOTE THE LARGE WINDOW AREA.

The vice-president and treasurer of this company is L. A. Pleukarp, and Edward Wittman is secretary and general manager.

Another large brass foundry is that of the Jeffrey Manufacturing Company, located at its immense machinery plant on North Fourth Street. This foundry was started in the early 'nineties, and is now pouring about ten tons of metal weekly. Other foundries in the brass, bronze and aluminum line are the City Brass Foundry on Scioto Street, the Schmitt Brass Foundry on Parsons Avenue, the Simplex Foundry on Dennison Avenue, the Ohio Pump and Brass Company on Oak Street, the Weiman Pump Manufacturing Company on Spruce Street, and the Buckeye Pump and Manufacturing Company on South Eighteenth Street. The most important manu-

The Schmitt Brass Foundry Company, mentioned above, manufactures brass, bronze and aluminum castings of all kinds, including production of jobbing work. They employ twelve men, and have an output of 3,000 pounds per day. They plan to erect a brass foundry and machine shop within the coming year, as their present plant is not large enough to accommodate their customers.

COLLEGE TRAINING FOR FOUNDRYMEN

In the College of Engineering of the Ohio State University metallurgy takes a prominent place as the college recognizes the paramount place which metals and metallurgy have in the engineering and industrial life of the Nation. It is of course impossible to operate a steel or brass works on a commercial scale at a university. Consequently the equipment must be so selected as to illustrate clearly the principles involved. For practical manipulative experience they require their students to get a certain amount of practical experience in metallurgical works before they are allowed to take their advanced work at the university. However, some metallurgical equipment of a practical nature is operated by the students to emphasize and make real the principles of metallurgy. The college operates:

(1) Foundry occupying a room 50 by 100 feet equipped with an iron cupola and moulding necessities, and several small brass melting furnaces, gas fired.

(2) 100 KW electric furnace used chiefly for steel making but arranged with horizontal as well as vertical electrodes so that the red brasses and bronzes can be melted. Also numerous pot furnaces for melting individual charges.

(3) Completely equipped metallographic laboratory for the microscopic and physical study of steels, brasses and alloys in general, and their chemical analysis is carried on by students in a large chemical laboratory in the Department of Metallurgy.

Messrs. Demorest and Hall, who are in charge of this department, will be glad to show visitors everything.

PRESENT STATUS OF FOUNDRY INDUSTRY IN COLUMBUS

It is practically since 1900 that the greatest development in the brass and allied foundries has been made. The business was stimulated to a marked degree by the Great War, and furthermore, nearly all the increase gained during the war has been maintained, and steps are being taken even now for further development. Much progress has been made in rapidity of manufacture and in sales methods, especially within recent date, promoting the business considerably. The result is that the estimated 15,000 to 20,000 tons of metal poured by the Columbus foundries annually is believed to be a very conservative estimate.

A marked change has been made in the methods of manufacture since the opening of the first important brass foundry in Columbus. At first the brass, bronze and aluminum were heated and melted with coke. This soon gave way to oil for melting, but the quantity of natural gas in Columbus led to the use of this instead of oil. During two years this old-fashioned method of heating has begun to yield to the use of electricity, which is for many purposes far superior to the methods previously in use.

IMPORTANCE OF THE CONVENTION

It is worth noting that so scholarly a work as the Encyclopedia Britannica mentions the fact that Columbus is known as a convention city. The convention and exhibit of the American Foundrymen's Association and the Metals Division of the A.I.M.E., to be held the week of October 4, should prove its popularity in this regard. This annual meeting is an event among manufacturers of castings; it means a record of the most advanced ideas in casting practice, and a full discussion of the technical problems involved. Separate sessions are held for the Gray Iron, Steel and Malleable Castings Sections, for the Industrial Relations Section, and for the newly created and therefore peculiarly interesting Non-Ferrous Department, of special attraction for brass and aluminum foundrymen. Of course visits to the leading plants in and near Columbus are being arranged, but it is certain

C. E. HOYT, SECRETARY, A. F. A.

that the contact with the biggest men in the field should stimulate interest and activity. The annual banquet has in previous years been addressed by men of the prominence of Charles M. Schwab, Secretary of War Baker, Secretary of the Interior Nagel, Former Assistant District Attorney General James M. Beck and other notables. But the chief significance is the view of the most modern equipment in the way of machine tools and allied manufactures, and the unexampled opportunity for the exchange of ideas on all the problems and questions and details of the metal industry.

A great economist has said: "Under the new order the first requisite of ordinary productive industry is no longer the workman and his manual skill, but rather the mechanical equipment and the standardized processes in which the mechanical equipment is engaged. And this latter-day industrial equipment and process embodies not the manual skill, dexterity and judgment of an individual workman, but rather the accumulated technological wisdom of the community." He goes on to say: "The possible or potential productive capacity of any given community, having the disposal of a given complement of man power and material resources, is a matter of the state of the industrial arts, the technological knowledge, which the community has the use of; this sets the limit, determines the 'maximum' production of which the community is capable. . . . The state of the industrial arts, therefore, is the indispensable conditioning circumstance which determines the productive capacity of any given community; and this is true in a peculiar degree under this new order of industry, in which the industrial arts have reached an unexampled development." If this is true, and we think it is, the coming convention of men interested in one of the most important phases of the industrial arts today is of immense importance not only to them as individuals, but to the community as a whole. And the value of the convention may be measured not merely in what each buyer or seller, each inventor, metallurgist or engineer can take from it, but what they all contribute and what they each bring home.

List of Exhibitors

Bldg.	Firm.	Address.
6	Acheson Graphite Co.	Niagara Falls, N. Y.
6	Air Reduction Sales Co.	New York, N. Y.
2	Ajax Metal Co.	Philadelphia, Pa.
3	Akron Cultivator & Mfg. Co.	Akron, O.
1	American Boron Products Co.	Reading, Pa.
7	American Foundry Equipment Co.	New York, N. Y.
2	American Hominy Co.	Indianapolis, Ind.
1	Amer. LaFrance Fire Engine Co.	Pittsburgh, Pa.
7	American Molding Machine Co.	Terre Haute, Ind.
5	American Woodworking Mach. Co.	Rochester, N. Y.
7	Arcade Mfg. Co.	Freeport, Ill.
2	Asbury Graphite Mills	Asbury, N. J.
2	Ashland Brass Foundry	Ashland, O.
5	E. C. Atkins & Co.	Indianapolis, Ind.
1	The Austin Co.	Cleveland, O.
2	Automatic Transportation Co.	Buffalo, N. Y.
2	Bacharach Indus. Instrument Co.	Pittsburgh, Pa.
5	Baker Brothers	Toledo, O.
3	Barrett-Cravens Co.	Chicago, Ill.
3	C. O. Bartlett & Snow Co.	Cleveland, O.
6	Bastian Blessing Co.	Chicago, Ill.
5	A. E. Baur & Son.	Chicago, Ill.
2	Bausch & Lomb Optical Co.	Rochester, N. Y.
2	Beaudry & Co.	Boston, Mass.
7	Berkshire Mfg. Co.	Cleveland, O.
5	Charles H. Besly Co.	Chicago, Ill.
1	Bethlehem Steel Co.	Bethlehem, Pa.
7	Beyer Machine Co.	Jackson, Mich.
1	S. Birkenstein & Sons, Inc.	Chicago, Ill.
5	The Black & Decker Mfg. Co.	Baltimore, Md.
5	Black Diamond Saw & Mach. Co.	Natick, Mass.
3	Blaw-Knox Co.	Pittsburgh, Pa.
7	Blystone Mfg. Co.	Cambridge Springs, Pa.
6	Booth Electric Furnace Co.	Chicago, Ill.
1	Brass World Publishing Co.	New York, N. Y.
2	The British Aluminum Co., Ltd.	New York, N. Y.
2	Brown Instrument Co.	Philadelphia, Pa.
3	Buckeye Products Co.	Cincinnati, O.
6	Campbell-Hausfeld Co.	Harrison, O.
6	The Carborundum Co.	Niagara Falls, N. Y.
6	Caward-Gaskill Furnace Corp.	Chicago, Ill.
7	Champion Foundry & Machine Co.	Chicago, Ill.
2	Frank D. Chase, Inc.	Chicago, Ill.
5	Chesapeake Iron Works	Baltimore, Md
1	Chicago Crucible Co.	Chicago, Ill.
4	Chicago Pneumatic Tool Co.	New York, N. Y.
1	Charles J. Clark Meter Co.	Gladbrook, Ia.
2	Clark Tructractor Co.	Buchanan, Mich.
2	Cleveland Flux Co.	Cleveland, O.
4	Cleveland Pneumatic Tool Co.	Cleveland, O.
5	Clipper Belt Lacer Co.	Grand Rapids, Mich.
2	Thomas E. Coale Lumber Co.	Philadelphia, Pa.
2	Combined Supply & Equipment Co.	Buffalo, N. Y.
2	Cooper Mfg. Co.	York, Pa.
2	Corn Products Refining Co.	New York, N. Y.
4	Curtis Pneumatic Machinery Co.	St. Louis, Mo.
7	Davenport Machine & Foundry Co.	Davenport, Ia.
6	Davis Bournonville Co.	Jersey City, N. J.
4	Dayton Pneumatic Tool Co.	Dayton, O.
6	Detroit Electric Furnace Co.	Detroit, Mich.
1	Detroit Soluble Oil Co.	Detroit, Mich.
2	Diamond Clamp & Flask Co.	Richmond, Ind.
1	Diamond Oil Co.	Philadelphia, Pa.
5	Dings Magnetic Separator Co.	Milwaukee, Wis.
5	Henry Disston & Sons, Inc.	Philadelphia, Pa.
5	Divine Bros. Co.	Utica, N. Y.
2	Joseph Dixon Crucible Co.	Chicago, Ill.
2	Stanley Doggett, Inc.	New York, N. Y.
6	The Electric Furnace Co.	Salem, O.
6	Electric Welding Machine Co.	Detroit, Mich.
7	Federal Foundry Supply Co.	Cleveland, O.
7	Federal Malleable Co.	West Allis, Wis.
1	H. K. Ferguson Co.	Cleveland, O.
2	Firefoam Service & Supply Co.	Cleveland, O.
2	Foreign Crucibles Corp., Ltd.	New York, N. Y.
2	The Foundry Equipment Co.	Cleveland, O.
5	Gardner Machine Co.	Beloit, Wis.
6	Geist Mfg. Co.	Atlantic City, N. J.
3	General Electric Co.	Schenectady, N. Y.
2	Robert Gordon, Inc.	Chicago, Ill.
7	Great Western Mfg. Co.	Leavenworth, Kan.
1	Great Western Smelt. & Refin. Co.	Chicago, Ill.
7	Grimes Molding Machine Co.	Detroit, Mich.
5	Gurney Ball Bearing Co.	Jamestown, N. Y.
6	Hardinge Co.	New York, N. Y.
2	The Clement A. Hardy Co.	Chicago, Ill.
2	F. A. Hardy & Co.	Chicago, Ill.
2	Benjamin Harris & Co.	Chicago, Ill.
2	R. G. Haskins Co.	Chicago, Ill.
6	Hauck Mfg. Co.	Brooklyn, N. Y.
5	Haynes Stellite Co.	Kokomo, Ind.
5	Hayward Co.	New York, N. Y.
5	Heald Machine Co.	Worcester, Mass.
2	Hill-Brunner Foundry Supply Co.	Cincinnati, O.
2	The Hill & Griffith Co.	Cincinnati, O.
4	Hoevel Mfg. Corp.	Jersey City, N. J.
1	Holland Core Oil Co.	Chicago, Ill.
6	E. C. Humphreys & Co.	Chicago, Ill.
4	Independent Pneumatic Tool Co.	Chicago, Ill.
6	Industrial Electric Furnace Co.	Chicago, Ill.
7	Ingersoll-Rand Co.	New York, N. Y.
7	International Molding Machine Co.	Chicago, Ill.
2	Interstate Sand Co.	Zanesville, O.
3	The Iron Age	New York, N. Y.
1	Jennison-Wright Co.	Toledo, O.
1	Jones Sand Co.	Columbus, O.
2	Chas. Jurack Pattern Works	Milwaukee, Wis.
2	Chas. C. Kawin Co.	Chicago, Ill.
2	Keener Sand & Clay Co.	Columbus, O.
4	Keller Pneumatic Tool Co.	Chicago, Ill.
1	Spencer Kellogg & Sons, Inc.	Buffalo, N. Y.
2	T. P. Kelly & Co., Inc.	New York, N. Y.
7	Kilbourne & Jacobs Mfg. Co.	Columbus, O.
6	King Refractories Co., Inc.	Buffalo, N. Y.
5	E. A. Kinsey Co.	Cincinnati, O.
2	C. E. Knoeppel & Co., Inc.	New York, N. Y.
3	Lakewood Engineering Co.	Cleveland, O.
1	Henry M. Lane Co.	Detroit, Mich.
4	Lewis-Shepard Co.	Boston, Mass.
2	Lindsay Chaplet & Mfg. Co.	Philadelphia, Pa.
3	Link Belt Co.	Chicago, Ill.
7	Locke Pattern Works	Detroit, Mich.
4	Louden Machinery Co.	Fairfield, Ia.
5	Lucas Machine Tool Co.	Cleveland, O.
5	Ludlum Steel Co.	Watervliet, N. Y.
2	David Lupton's Sons Co.	Philadelphia, Pa.
3	J. S. McCormick Co.	Pittsburgh, Pa.
2	McLain's System	Milwaukee, Wis.
5	Machinery	New York, N. Y.
1	MacLean Publishing Co.	Toronto, Ontario, Can.
4	The MacLeod Co.	Cincinnati, O.
5	Magnetic Mfg. Co.	Milwaukee, Wis.
6	Mahr Mfg. Co.	Minneapolis, Minn.
7	Malleable Iron Fittings Co.	Branford, Conn.
2	Marden, Orth & Hastings Co., Inc.	New York, N. Y.
6	Maxon Furnace & Engineering Co.	Muncie, Ind.
7	Menefee Foundry Co.	Fort Wayne, Ind.
2	Mercury Mfg. Co.	Chicago, Ill.
2	The Metal Industry	New York, N. Y.
5	Metal Saw & Machine Co.	Springfield, Mass.
6	Metal & Thermit Corp.	New York, N. Y.
2	Michigan Smelt. & Refining Co.	Detroit, Mich.

Bldg.	Firm.	Address.
6	Alexander Milburn Co.	Baltimore, Md.
3	Monarch Engineering & Mfg. Co.	Baltimore, Md.
4	Mott Sand Blast Mfg. Co.	Brooklyn, N. Y.
7	Mumford Molding Machine Co.	Chicago, Ill.
3	National Engineering Co.	Chicago, Ill.
2	National Scale Co.	Chicopee Falls, Mass.
7	Wm. H. Nicholls Co., Inc.	Brooklyn, N. Y.
5	Norma Co. of America	Long Island City, N. Y.
5	Norton Co.	Worcester, Mass.
3	S. Obermayer Co.	Chicago, Ill.
4	The Ohio Body & Blower Co.	Cleveland, O.
2	Ohio Equipment Co.	Cleveland, O.
2	Ohio Metal Co.	Columbus, O.
4	George Oldham & Son Co.	Philadelphia, Pa.
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5	Osborne & Sexton Machinery Co.	Columbus, O.
6	Oxweld Acetylene Co.	Chicago, Ill.
1	Paine & Co.	Wilkes-Barre, Pa.
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1	Pickands, Brown & Co.	Chicago, Ill.
2	Pittsburgh Crushed Steel Co.	Pittsburgh, Pa.
7	Porcelain Enamel & Mfg. Co.	Baltimore, Md.
4	Portage Silica Co.	Youngstown, O.
7	Henry E. Pridmore, Inc.	Chicago, Ill.
6	Quigley Furnace Specialties Co.	New York, N. Y.
5	Racine Tool & Machine Co.	Racine, Wis.
5	Railway Mechanical Engineer.	Chicago, Ill.
3	Raymond Bros. Impact Pulv'er Co.	Chicago, Ill.
3	Richards-Wilcox Mfg. Co.	Aurora, Ill.
1	Dwight P. Robinson & Co.	New York, N. Y.
2	Rogers, Brown & Co.	Cincinnati, O.
3	P. H. & F. M. Roots Co.	Connersville, Ind.
1	S-T Engineering Corp.	Buffalo, N. Y.
1	Safety Equipment Service Co.	Cleveland, O.
2	Safety First Shoe Co.	Providence, R. I.
5	Simonds Mfg. Co.	Fitchburg, Mass.
3	W. W. Sly Mfg. Co.	Cleveland, O.
2	R. P. Smith & Sons Co.	Chicago, Ill.
2	Werner G. Smith Co.	Cleveland, O.
6	Spencer Turbine Co.	Hartford, Conn.
4	Standard Equipment Co.	New Haven, Conn.
7	Standard Sand & Machine Co.	Cleveland, O.
4	Sterling Wheelbarrow Co.	West Allis, Mil., Wis.
2	Frederic B. Stevens.	Detroit, Mich.
2	W. G. Stodder.	Syracuse, N. Y.
4	Sullivan Machinery Co.	Chicago, Ill.
2	Superior Sand Co.	Cleveland, O.
7	R. J. Teetor Co.	Muskegon, Mich.
5	Thomas Elevator Co.	Chicago, Ill.
6	Torchweld Equipment Co.	Chicago, Ill.
1	Trucson Steel Co.	Detroit, Mich.
2	United Compound Co.	Buffalo, N. Y.
2	United States Graphite Co.	Saginaw, Mich.
7	U. S. Molding Machine Co.	Cleveland, O.
2	United States Silica Co.	Chicago, Ill.
6	U. S. Smelting Furnace Co.	Belleville, Ill.
7	Vibrating Machinery Co.	Chicago, Ill.
2	Wadsworth Core Mach.&Eqpt. Co.	Akron, O.
5	J. D. Wallace & Co.	Chicago, Ill.
5	Warner & Swasey Co.	Cleveland, O.
6	Wayne Oil Tank & Pump Co.	Fort Wayne, Ind.
5	Westinghouse Elec. & Mfg. Co.	East Pittsburgh, Pa.
1	Westinghouse Traction Brake Co.	Pittsburgh, Pa.
6	F. H. Wheeler Mfg. Co.	Chicago, Ill.
2	White & Bro.	Philadelphia, Pa.
2	Whitehead Bros. Co.	Buffalo, N. Y.
3	Whiting Foundry Equipment Co.	Harvey, Ill.
5	Whitman & Barnes Mfg. Co.	Akron, O.
4	E. J. Woodison Co.	Detroit, Mich.
2	T. B. Wood's Sons Co.	Chambersburg, Pa.
5	Wright Mfg. Co.	Lisbon, O.
3	Young Bros. Co.	Detroit, Mich.

SOME OF THE EXHIBITS

White & Bro., Inc., Philadelphia, Pa.—C. C. Brand of Casting Copper, Composition and Bronze Ingot metals, "Marine Brand," Manganese Bronze, Yellow Brass Ingot Metals, Babbitt Metals and all ingot metals.

Representatives who will be in attendance are:—Frank Krug, Sales Manager; Raymond Hunter, Horace Krider, L. D. Kluver, Frederick A. Reinhardt.

Monarch Engineering & Manufacturing Company, Baltimore, Md.—One 1-ton Motor Driven Revolving non-crucible Furnace; one No. 92-600 Simplex crucible Furnace; one No. 1 Double Chamber non-crucible Furnace; one No. 150 Crucible Tilting coke Furnace; one No. 125 Crucible Tilting Gas Furnace and Motor Blower; one No. 40 Crucible Stationary Gas Furnace; one Vertical Tilting oil or gas Furnace, without crucibles; one No. 80 Stationary crucible Pre-heater air Furnace, Oil; one No. 3 Acme Core Oven, Oil; one No. 4 Acme Core Oven, coke, oil or gas; one Victory-Permanent Mold Machine (for brass and iron castings); one Ladle Heater, oil and gas; one Oil Pump; one Positive Pressure Blower.

Representatives will be H. D. Harvey, Treasurer; James J. Allen, Manager; Frank Maujean; James V. Martin and William Raber, Representatives.

Pangborn Corporation, Hagerstown, Md.—The smallest known motor in the world. The Commutator has four segments made of gold, each segment being insulated from each other with mica. Fibre is used as insulation between commutator and shaft; also between the end piece and commutator. The commutator is built up in the same way as the ones in the large machines, no glue or cement having been used in its construction. The diameter of the commutator is 45-1000 in. The commutator is mounted on pivot steel shaft, 9-1000 in. in diameter. The armature has four poles and is wound with No. 40 silk covered wire. The diameter of the armature is 90-1000 inches.

TINY MOTOR.

The length of the motor over all is 19-64 in. Height 11-64 in. It weighs complete 5½ grains. A small flashlight battery is used to supply its current.

This motor was made by Mr. Ivan T. Nedland, Hillsboro, N. D.

Ajax Metal Company, Philadelphia, Pa.—Customary line of Ajax Plastic Ingots and Castings, and also the 60-Kw. Ajax-Wyatt Electric Furnace which has been adopted by so many foundries in the course of the past year.

They are also planning to exhibit a representative line of our Babbitt metals and also the new bars of Ajax Bull Bearing Alloy.

The following representatives of the Ajax Metal Company will be in attendance throughout the exhibit: G. H. Clamer, first vice president and secretary; W. J. Coane, second vice president and sales manager; Frank M. Willeson, manager of Boston office; Louis E. Purnell, manager of Cleveland office; John G. Miller, manager of Chicago office; James K. Wyatt, superintendent of electric furnace department; Donald H. Fairfield, sales engineer.

TECHNICAL PROGRAM OF THE CONVENTION

TENTATIVE GENERAL PROGRAM

MONDAY, OCT. 4

10:00 a. m.—Registration.
10:00 a. m.—Exhibit opens. Closes 5:00 p. m.

TUESDAY, OCT. 5

9:00 a. m.—10:00 p. m.—Exhibition.
9:30 a. m.—Gray Iron Session.
2:00 p. m.—Steel Session.
2:00 p. m.—Non-ferrous Session.

WEDNESDAY, OCT. 6

9:00 a. m.—5:00 p. m.—Exhibition.
9:30 a. m.—Steel Session.
9:30 a. m.—Non-ferrous Session.
2:00 p. m.—Industrial Relations Session.
7:00 p. m.—Annual Banquet.

THURSDAY, OCT. 7

9:00 a. m.—5:00 p. m.—Exhibition.
9:30 a. m.—Industrial Relations Session.
1:30 p. m.—Entertainment.
8:00 p. m.—Smoker, including business session.

FRIDAY, OCT. 8

9:00 a. m.—5:00 p. m.—Exhibition.
9:30 a. m.—Malleable Session.
9:30 a. m.—General Session.

TENTATIVE PROGRAM FOR NON-FERROUS MEETINGS

Tuesday afternoon, Oct. 5. Joint session with the American Foundrymen's Assn.—Non-ferrous Foundry.

Investigation of Brass-foundry Fluxes, by C. W. Hill, T. P. Thomas and W. B. Vietz.

Laboratory Testing of Sands, Cores and Core-binders, by F. L. Wolf and A. A. Grubb.

Reclamation of Metal from Brass-foundry Refuse, by F. L. Wolf and G. E. Alderson.

New Process for making Fifteen Per Cent Phosphor-copper, by P. E. Demmler.

*Recent Developments in Die-Castings, by Chas. Pack.

†The Solubility of Hydrogen in Molten Copper and Copper Alloys, by C. W. Hill, T. P. Thomas, and G. P. Luckey.

Wednesday morning, Oct. 6. Joint Session with the American Foundrymen's Assn.—Non-ferrous Foundry, casting of aluminum alloys, metals melting.

*Problems of the Brass Foundryman, by Russell R. Clarke.

*Casting Losses in the Aluminum Foundry, by R. J. Anderson.

†Coke and Byproducts as Fuels for Metals Melting, by F. W. Sperr, Jr.

*New Electric Furnace for Melting Brass, by C. H. Booth.

*Status of the Electric Furnace in Non-ferrous Industries by E. F. Cone.

(Additional papers from the A. F. A. on the electric furnace.)

Wednesday afternoon, Oct. 6. Refractory, session of Electric Furnace Assn. All members of Institute of Metals Division are invited to attend.

Thursday morning, Oct. 7. General and metallographic session.

Charpy Impact Test as Applied to Aluminum Alloys, by E. H. Dix.

Colloidal State in Metals and Alloys, by Jerome Alexander.

Transition Phenomena in Amalgams, by A. W. Gray.

Physical Tests on Sheet Nickel-silver, by W. B. Price and P. Davidson.

†Nickel-chromium Alloys, by Leon O. Hart.

†Copper Crusher Cylinders, by A. I. Krynitzky.

†This paper will be presented at the meeting but may not be published by the A. I. M. E.
*From the American Foundrymen's Association.

Fifty-Eight Years of Service

Mark L. Sperry, President of the Scovill Manufacturing Company, Waterbury, Conn., Retires

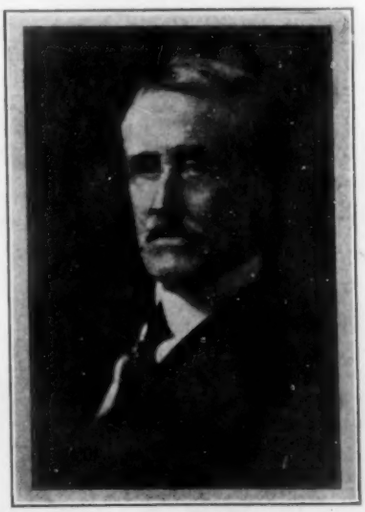
What the new president, Mr. Goss, says of Mr. Sperry (in the Scovill Manufacturing Company Bulletin, September, 1920) is significant.

"The chronology of the service with the Scovill Manufacturing Company of Mr. Mark L. Sperry, covering as it does a span of fifty-eight years, reveals in a very marked degree what a fixed but tenable purpose can accomplish within the span of life ordinarily allotted to man. Mr. Sperry entered the employ of the company August 5, 1862, as a clerk, and served in this capacity, and as head accountant until his election as Secretary, January 25th, 1869, succeeding in that office the late Mr. Chauncey P. Goss.

"The oldest employees of the company will recall the young man who occupied a high stool at a higher desk in the little one-story office building which stood near the present Mill Street Gate.

"The constant study of conditions and the unremitting industry and application which characterize Mr. Sperry's career were especially in evidence during this period and became the foundation for an experience of inestimable value to the company and to the community.

"Mr. Sperry was elected a Director of the company at a special meeting held December 21st, 1877, succeeding Mr. Samuel W. Hall, deceased. November 18, 1910, he was elected Vice-President, succeeding Mr. F. J. Kingsbury, whose death had occurred September 30th. On October 22, 1918, he succeeded the late Mr. Chauncey P. Goss in the presidency.



MARK L. SPERRY

"To those who have been close to Mr. Sperry in his business life the exemplary characteristics which impress one are fundamental to strong characters wherever they exist.

"His abhorrence of deception in any form and his contempt of hypocrisy are noteworthy as the basis for an uncompromising integrity both in his social and business relationships.

"It has been a very great privilege to have been associated with him, either socially or in business, and this privilege is gratefully acknowledged by all who have been so fortunately situated as to come under his training."

Briquetting of Metal Scrap

A Description of a Modern Method of Handling Loose Metal Scrap of all Descriptions

Written for The Metal Industry by ADOLPH BREGMAN, Managing Editor

REASONS FOR BRIQUETTING.

It is of considerable interest to the observer in the metal trades to see that although briquetting has been in existence for some time, and although its value has been proved, nevertheless there are still numberless plants which could and should briquet their materials, where it is not done. A large part of the reason for this situation is that the manufacture of the briquets, perhaps more than most other metallurgical industries, has much of its experimental work still to do.

Nevertheless, the fact exists that the need for briquetting is present. Wherever metal is being cut or shaped, turnings, millings and clippings accumulate. These, if handled loosely are a constant annoyance and even loss to the melter.

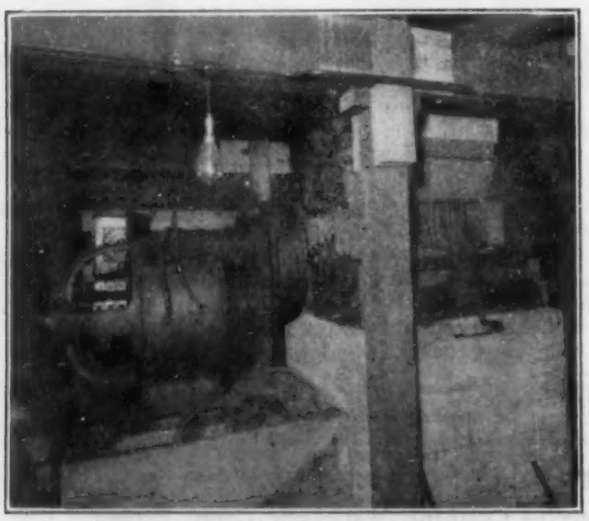


FIG. 1. GILMORE SHREDDER.

In general the advantages sought for by briquetting are as follows:

1. Reduction of oxidation of metal.
2. Increased ease and speed of handling.
3. Reduction of losses in handling.
4. Elimination of flue-dust losses.

Metals which call for briquetting are generally in one of two forms, either as fines, such as grindings, chippings, or very short turnings, or (2) in strings, rings or similarly shaped material, such as long turnings, etc. Under the old methods these are handled without any attempt to reduce their size in any way. Enough good metal is melted in the furnace to form a fairly deep bath and these pieces are pushed under the surface and puddled. Sometimes the stringy material is pounded together by hand, or perhaps placed in a receptacle of scrap material and cabbaged. The difficulties of this procedure are obvious. There are mechanical losses, flue dust losses and decidedly slow operation.

In connection with this subject, it might be of interest to describe the methods employed in a modern, well equipped briquetting plant. Before the briquetting job is undertaken, samples are formed in the experimental laboratory, and various questions answered as far as possible before proceeding with the work of briquetting on a large scale. A few of these questions are as follows:

Does the material need any treatment before briquetting, and if so, what?

What is the best machine for this material?

What sort of machinery is necessary for the cheapest and best handling of this material after briquetting?

What are the melting conditions of the finished product?

What will the briquets cost to produce?

At this plant (General Briquetting Company, New York City) the operations through which the metal goes are the following:

1. Disintegrating.
2. Drying.
3. Removal of iron.
4. Briquetting.

DISINTEGRATING.

The first process is simply that of thoroughly separating each piece of material from every other piece, by means of a Gilmore Shredder. As the metal comes to the plant it is often entangled in peculiar shapes, which would make it difficult or often impossible to feed to the briquetting machine. Therefore, it has to be separated or "carded." The machine which carries on this work is composed of a set of rolls with meshing teeth, which feed the metal to the disintegrator proper, which has a toothed or knobbed roll, which as it revolves, meshes with a stationary grooved plate. The knobs on the roll fit with very slight clearance into the grooves on the plate and as the roll revolves, pull the metal through that clearance. There is not sufficient room for any knots or entanglements to pass, and the power is sufficient so that if any do reach this machine they are torn apart or shredded when the roll revolves. While the metal is being shredded it is also being cut into small lengths, by the same action. Figure 1 shows this shedder in place.

DRYING.

The material is then moved to a Rockwell Rotary Dryer which is a horizontal drum about 15 feet long and 4 feet

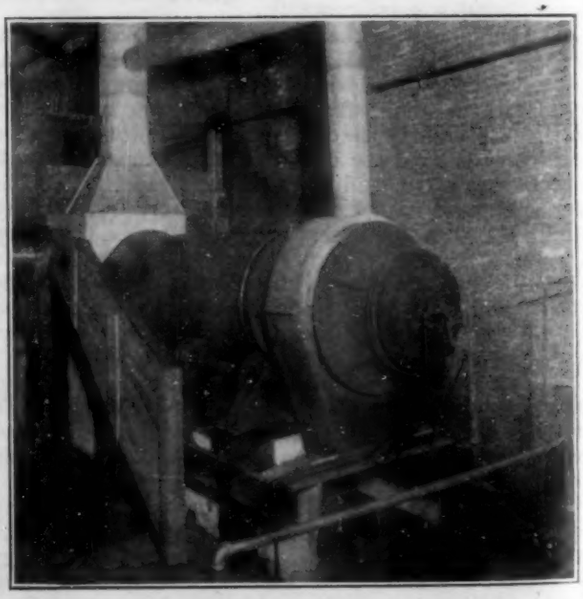


FIG. 2. ROCKWELL ROTARY DRYER.

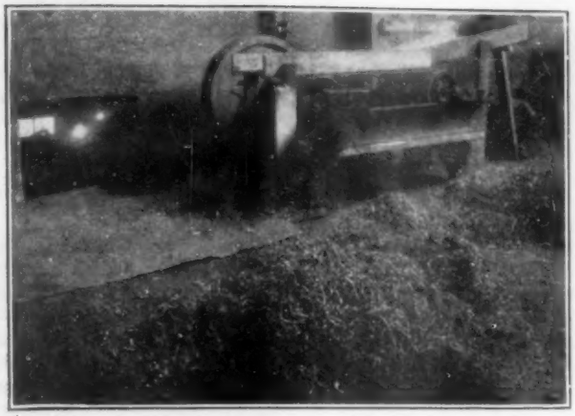


FIG. 3. MAGNETIC SEPARATOR.

in diameter. This drum is set with the feed end a little higher than the discharge end, and a burner is placed at the discharge end which throws a flame up through the whole furnace, exhausting through a small stack. The metal is fed to the dryer through a hopper and as the drum revolves at a moderate speed the metal is carried progressively down to the discharge end partly by gravity and partly by the vanes inside the furnace, which are so shaped as to push the metal along in one direction. The dried pieces are then discharged automatically through a hole in the shell of the drum, which comes into the discharge position with each revolution.

This process has two effects on the metal. In the first place it burns off all the oil or grease that may have been on it at the time of shipment. In the second place it anneals the metal, or softens it so that it can be briquetted without having the ordinary tendency to spring back out of the briquette. It has been found that by giving the metal this preliminary heat treatment, a large part of the difficulty of forming briquettes out of the stringy material is overcome.

MAGNETIC SEPARATION.

From the dryer the metal is transferred to the magnetic separator, which is simple both in principle and in operation. The pieces run over a magnetic pulley, and are very simply and thoroughly separated from any loose iron.

BRIQUETTING.

From the separator the metal is fed directly to the hydraulic briquetting presses. These presses are of two sorts, the Ronay three-stage (or "A") press and the "C" press. A short description of the operation of the "A" press would be of interest, as an automatic machine for turning out solid briquettes from loose material of any sort. The metal is fed through a hopper down onto a circular platen, which has six holes and three plungers spaced evenly around the circle. The whole affair is controlled by a single motor, and the operation of the plungers is effected by means of a set of cams, which operate the pump so as to cause the plungers to work only when the holes are in position to receive them. The platen moves automatically a sixth of a revolution at a time. The metal is fed into the first hole and is packed by a low pressure plunger. It is then moved around by the intermittent movements of the platen until it reaches the position of the high pressure ram. By this time the material is partially formed and has the proper amount of metal in the mold. The high pressure ram operates in a

FIG. 4. TYPE "C" PRESS DURING OPERATION. NOTE THE FINISHED BRIQUET BEING DISCHARGED THROUGH THE SLOT AT THE RIGHT END OF THE PRESS.

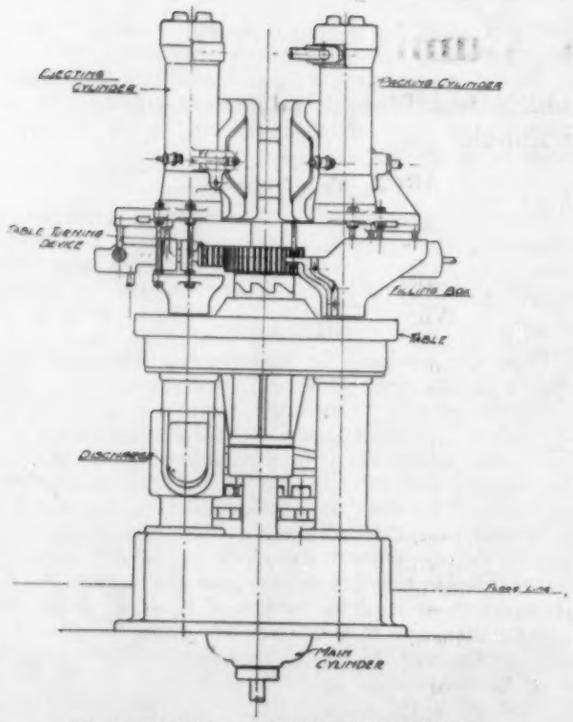


FIG. 5. DETAIL OF RONAY 3-STAGE PRESS.

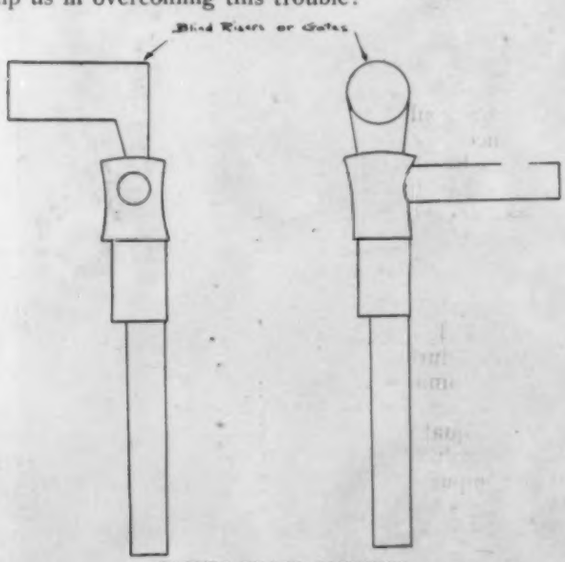
floating mold in which the pressure is applied from both above and below, the mold itself being loose. After the final pressing the briquette is carried around by the movement of the platen until it is directly over a discharge spout, into which it is forced by a low pressure plunger and thus ejected. The metal is now ready for the melter.

The "C" press is a simple affair. It consists of a single cylinder which is operated by levers controlling the hydraulic pressure. The loose material is dropped by hand into a half open mold. The plunger is brought up and pushes this material into the closed cylindrical mold against a heavy blank end. When, in the judgment of the operator, sufficient metal has been placed in the mold and enough pressure has been applied the blank is removed from the end of the mold and the briquette discharged. This process also makes satisfactory briquettes, but it is largely operated by hand, it is used more as an experimental press than for regular operations. Its capacity is up to 500 lbs. per hour and the working pressure is from 3,000 to 20,000 pounds per square inch.

Hard bronze can be successfully treated in tonnage lots by the "A" press. It should be previously annealed, however, in the rotary furnace. Metal leaf and paper can be freely handled in the "C" press, after heating at a low temperature in the rotary furnace. Shot nickel can also be briquetted in the "C" press, but its early treatment calls for mixing with sulphite pitch binder, which can be effected in a pug-mill.

DEFECTIVE CASTINGS

Q.—Under separate cover we are sending you a sample casting of which we have a considerable quantity being run in our foundry at present. We have been troubled with a defect in the casting, causing it to break in the manner same as sample submitted. These castings are made of about 65/35 mixture and are gated on the small end. Could you offer us any suggestion which might help us in overcoming this trouble?



GATING BRASS CASTINGS.

A.—You state these castings are made of about 65/35 in mixture and are gated on the small end. Your trouble is caused by shrinkage due to the metal chilling almost instantly, and drawing from the light section. If you will gate as marked on sketch you will overcome this trouble. If you can not gate there use a Blind Riser to hold the heat until the casting is set. Even if all your castings do not crack they are weak at that point.—W. J. R.

ALUMINUM MATCH PLATES

The best mixture known to the writer for aluminum match plates is 92 aluminum, 7 copper, 1 nickel, fluxed with 1 oz. of magnesium. Make a harderer of 49 copper, 1 nickel, 50 aluminum, as follows: Melt the copper and nickel in one crucible. Heat another crucible, and place 50 lbs. of aluminum in the heated crucible. Pour the molten copper on the aluminum. Stir well and pour into ingots. Now melt 84 lbs. of aluminum, add 16 lbs. of the hardener and 1 oz. of magnesium. Never let the metal get over 1,600 deg. F. If it does it is better to pour it into ingots, remelt and pour at 1,300 deg. F.

However, it must not be forgotten that a lot depends on how the plate is molded. Take all the precautions such as: using a fine grade of sand and working it dry as possible, ramming soft as possible, placing risers on heavy parts, or internal chills. Internal chills are very often more satisfactory than risers. By internal chills is meant placing a chill in the inside of a heavy section. Also be careful how the gates are placed so as to avoid warping the plate.—W. J. R.

CORRECTION

A very unfortunate typographical error has been kindly called to our attention by L. M. Graham of the Connecticut Dynamo and Motor Company, of Irvington, N. J. On page 365 of our August issue the formula is given:

$$\text{B. T. U.'s} = \frac{\text{Watts}}{1000} \times \text{Hours}$$

$$= \frac{\text{Amperes} \times \text{Volts} \times \text{Hours}}{1000}$$

This should read:

$$\text{B. T. U.'s} = \frac{\text{Watts} \times 3{,}412}{1000} \times \text{Hours}$$

$$= \frac{\text{Amperes} \times \text{Volts} \times \text{Hours} \times 3{,}412}{1000}$$

Hardness of Certain Aluminum Alloys

A Compilation of the Investigations of M. M. Leon Guillet, Jean Durand and Jean Galibourg, from Revue de Metallurgie

Written for The Metal Industry by R. E. SEARCH, Metallurgist

PART I

As early as 1913 practical interest in the light alloys of aluminum had not escaped the notice of certain observers and they were able to say from that time what they thought, without anticipating the considerable development which was to give employment to these alloys, the further unknown necessities of the modern aeronautic war, the problem of the study of their properties, in particular that of duralumin, which was supposed.

At that time, December, 1913, in a letter addressed to one of the authors, Professor W. Rosenhain gave a summary, according to letters patent and the articles published in the scientific press on the subject of the special treatment of duralumin; it hardens at about 450 to 500 C., undergoes a hardening slowly, that is to say, that after the heating it possessed almost the same properties that it had before, but during the next four days it hardens, whilst the rupture charge increases to almost double its earlier value, and the elongation diminishes only from 20 to 25 per cent. In this way duralumin is hardened rather sensibly by less thermal treatment. That is, heating to 200 is sufficient to modify its mechanical properties.

The resume: Professor Rosenhain characterized only the fact and put in evidence the essential properties: retardation with the appearance of hardening by cooling, that it presents a very interesting anomaly which no other known alloy at least has shown.

The discovery of this positive phenomenon is due to Alfred Wilm; it was the result of the enterprising studies made by him since 1903. In an article published in 1911, Metallurgie VIII, 225, 1911 (Physical metallurgical investigations concerning aluminum alloys that contain magnesium), Wilm resumed his observations and in this way explained the particular fact that "the addition of carbon gives to iron the property of hardening by cooling; this property appears equally with aluminum, but here it is not due to the addition of carbon but to that of another metal alloyed with it: magnesium."

It is interesting to determine the result of the first researches. As a consequence the confirmation of the hardening is ascribed to the presence of magnesium. First of all Wilm mentions the fact that he has not succeeded in explaining the process or even some of the phenomena by micrographic verification. Afterwards he proved that the alloys of 0.5 per cent magnesium are soft immediately after quenching; the hardness increases in a notable manner after some hours, the increase of hardness continues more slowly during the ensuing hours. The simultaneous presence of copper augments very sensibly the hardening, as also all the other mechanical properties. According to him, however, a heating to 150 degrees would have no sensible influence upon the mechanical properties of the alloys with magnesium, whilst a heating to 200 degrees appreciably lowers these properties.

It was again observed that an addition of manganese increased the hardening whilst an addition of nickel raised the rupture charge, but the action of these various additions upon the mechanical properties is not explained by the results of the corresponding mechanical tests.

According to the dimensions of the cylinders, 30 mm. in length which had been shown to the authors, that immediately after quenching, the length was increased by 0.006 mm., but after several days this increase retrograded.

THE HARDNESS OF CERTAIN ALUMINUM ALLOYS

Finally Wilm pointed out as conclusive the important place that duralumin should receive in the technical equipment of war and aerial navigation. At that time duralumin was made in Germany by the Durener Metallwerken Aktien-Gesellschaft; in England by Vickers Brothers and by Maxim; in Austria-Hungary by the Societe Messingwerk C. Kulmiz, at Kramsach-Achenrain (Tyrol).

To resume, Wilm has identified the phenomena of retardation presented in the alloys studied, in the hardening by quenching, and he attributed this retardation to the presence of magnesium, the presence of copper having the effect of augmenting the final hardness.

Under these conditions, at the opening of 1914, the Society for the Encouragement of Industry charged one of the authors to resume the study of the alloy, in order to determine, if possible, the factors of cooling and the position of the probable critical point. The tests, which were carried out upon some specimens of commercial duralumin had the following composition:

	Cu.	Pb.	Mn.	Mg.	Fe.	Si.	Al.
A	3.49	——	0.48	0.50	0.33	0.50	Remainder
B	4.13	0.48	0.60	0.48	0.33	0.32	Remainder

These tests were interrupted by the war before any positive results were reached. Not any of the reactions that were tested showed micrographic results that were interesting. With regard to the dilatation tests made with the Le Chatelier-Broniewski apparatus, they were equally useless perhaps by reason of the deformation of the test piece under the action of the elastic tension of the mirror.

The experiments were repeated in 1919 and led rapidly to the results summarized in a note to the Academy of Sciences, transmitted by M. Henry Le Chatelier (Comptes-Rendus 169, p. 508 (1919); at the same time appeared the work of various Americans and a note from Lt.-Colonel Girard of the Academy of Sciences (Comptes-rendus Vol. 169, p. 571, 1919).

PART II

The investigation repeated by the authors at the beginning of 1919 were carried out upon specimens of commercial duralumin, that is to say, upon the extremely complex aluminum alloy of magnesium, copper, manganese, silicon and iron. All of these elements do not exert an equal influence upon the characteristic properties of duralumin, certainly they do not seem to intervene as impurities, but having studied by means of systematic tests those which indicate more indirectly the individual reaction of each of these additions, it has appeared to be useful to control for the current complex alloys the properties indicated by Wilm.

DETERMINATION OF THE TEMPERATURE OF QUENCHING

The duralumin studied had for its chemical composition:

Al., 93.9; Mg., 0.43; Cu., 3.7; Mn., 0.61; Si., 0.58; Fe., 0.53; Zn., 0.25.

A series of mechanical tests for the rough-drawn wire

under commercial forms has given the following results: R = 36.3 kg. per mm.²; E = 21.6 kg. per mm.²; A% = 21.3% elongation; hardness = 93; S = modulus of elasticity in kg. per mm.² specific resistance 5.6 kg. (on a

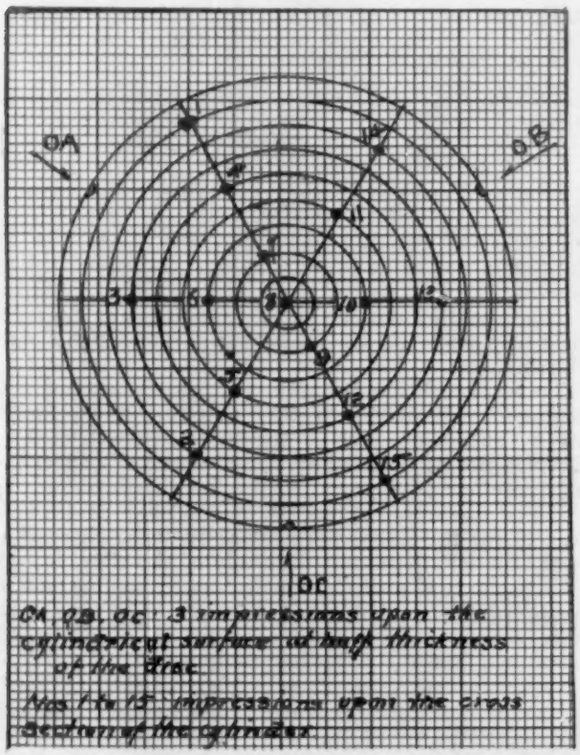

OA
OB
OC 3 impressions upon the cylindrical surface at half thickness of the disc
Nos 1 to 15 impressions upon the cross section of the cylinder

FIG. 1. BALL HARDNESS TESTS OF A DISC OF DURALUMIN, 90 MM. DIAM. BALL 10 MM. LOAD 3,000 KG.

Mesnager testing machine) where R is the rupture charge in kilograms per square millimeter, E = the elastic limit per square millimeter, A% = elongation per cent, D = hardness = pressure divided by the area, S = modulus of elasticity in kilograms per square millimeter; P = resistivity expressed in electrostatic units.

The same samples annealed at 475 presented the following novel characteristics:

R = 27 to 30 kg.; E = 10 to 14; A% = 20 to 22; D = 63 to 68; S = 53 to 45; P = 7 to 8.

From the point of view of the ball hardness, it is interesting to mention the results of the investigation of a bar of duralumin—unpublished results which have been communicated to the authors by M. A. Portevin.

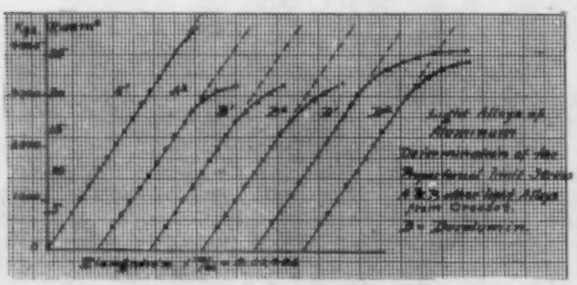


FIG. 2. PROPORTIONAL LIMIT STRESSES.

THE BALL-HARDNESS OF THE CROSS-SECTION OF A DURALUMIN ROD, 90 MM. IN DIAMETER

The conditions of the tests and the diagram of their position are given in the accompanying diagram, see Fig. 1. The results, in diameters of the impressions, are the mean of two measurements.

Distance to the surface in millimeters.	Number of impressions.	Diameter, mean in millimeters.	Average.
0	OA	5.75	
	OB	5.70	5.70
	OC	5.67	
10	2	5.77	5.71
	14	5.65	
15	3	5.70	5.73
	13	5.77	
20	4	5.75	5.78
	12	5.82	
25	5	5.92	5.86
	11	5.80	
30	6	5.82	5.84
	10	5.87	
35	7	5.87	5.90
	9	5.92	
45	8	6.05	6.05

From the same source the comparative determinations of the limit of elasticity are obtained which confirm the results expressed for cold worked metal in Fig. 2.

For investigation of the probable point of transformation and defining the quenching temperatures, after heating at a series of increasing temperatures, a series of specimens were quenched; the specimens were tempered preferably at 475, being heated in a bath of salt for five minutes and quenched in water at 15 C.

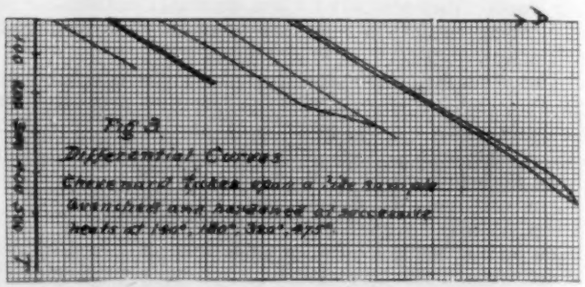


FIG. 3. DIFFERENTIAL CURVES.

The following table summarizes the results obtained:

Temperature of Heating Before Quenching.	Before Quenching Metal Temper-hardened.	Immediately After Quenching.	After One Hour.	After 24 Hours.	After 48 Hours.
300 C	65	61	61	61	61
400 C	65	61	61	61	61
450 C	65	61	61	65	93
500 C	65	61	61	86	93

Immediately after quenching the mechanical properties were: R = 25 to 29 kg.; E = 10 to 12 kg.; A% = 22 to 23: D = 41 to 45 kg; 59 S = 59 to 67.

In this test as in the following the hardness has always been determined with a load of 500 kilograms and a ball of 10 mm., and the specimen maintained at the constant temperature of 20 C.

One may deduce from the preceding figures that the minimum temperature reached before quenching by which is produced the phenomena of slow hardening is comprised within the limits of 400 and 450 C. (for alloys of the same composition as those studied). It is necessary to note also that, from the minimum temperature, the final hardness does not seem to depend upon the temperature attained in the heating before quenching. Not one of the methods utilized for the determination of

the transformation points has given the results upon the specimens previously temper-hardened; neither the dilatometer of Chevenard, nor the apparatus of Saladin-

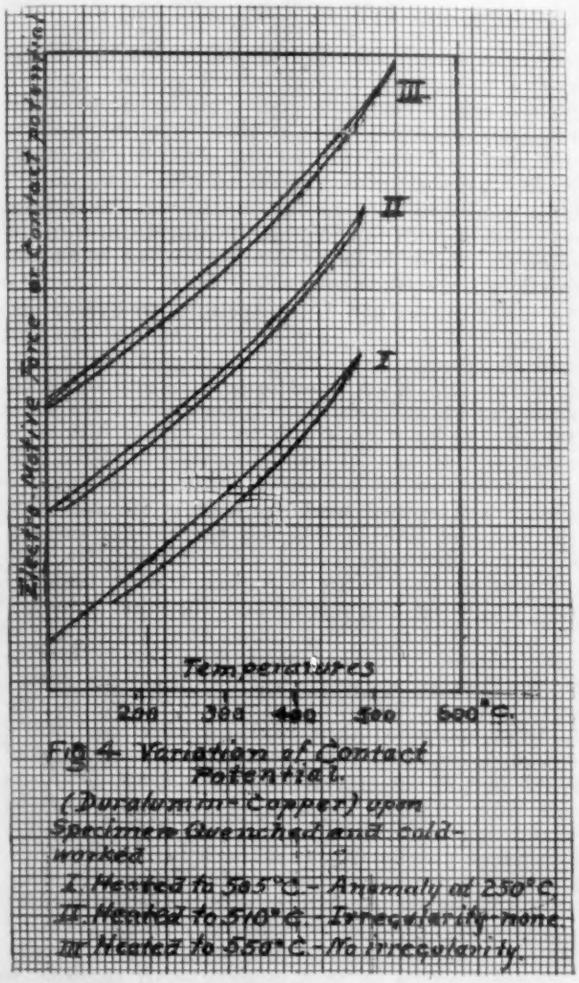


FIG. 4. VARIATION OF CONTACT POTENTIAL.

Le Chatelier, nor the study of the electromotive force of contact have evidenced the existence of the point of transformation (Figures 3 and 4). However, the efficiency of the quenching was alone characterized by the new mechanical properties of which the highest have been given.

It is interesting to note that the quenching is accompanied by a variation of the linear dimensions. It was mentioned that M. Wilm had studied the variations of length; his results indicate the highest may be compared with those obtained in 1918 by M. Portevin, and not yet published. These results very exactly show that contrary to the conclusions of M. Wilm, that the increase of length after quenching seems definitive.

The tests have been carried out on a specimen of duralumin, 100 millimeters in length, quenched at 425 C. in water, after having been heated in a bath of salt for

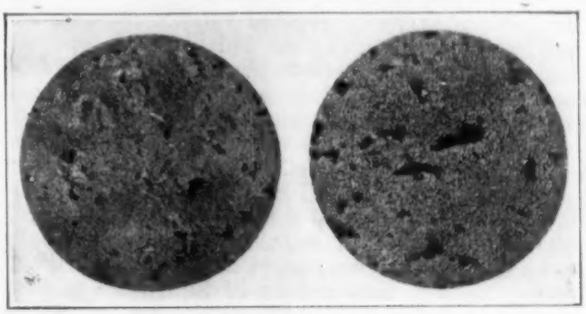


FIG. 5. DURALUMIN QUENCHED AND COLD-WORKED. MAGNIFIED 200. ETCHED WITH SODIUM HYDROXIDE.

FIG. 6. DURALUMIN QUENCHED AND COLD-WORKED. MAGNIFIED 530. ETCHED WITH SODIUM HYDROXIDE.

ten minutes; the measurements were made by A. P. X. and are summarized in the following table:

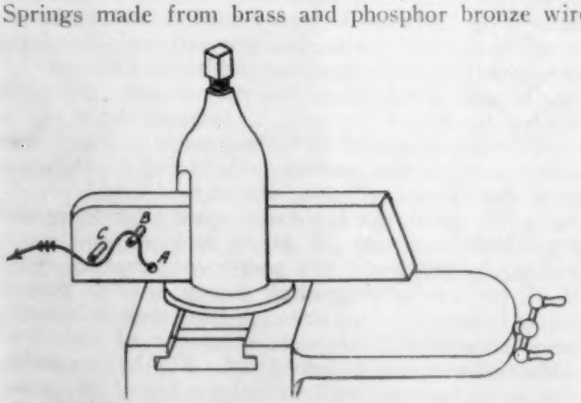
	Variations of Length in Microns.
After quenching	26
One-half hour after quenching	20
1½ hours after quenching	20
3 hours after quenching	19
6, 12, 24 hours, 3 days after quenching	18.5

The micrographic analysis, whatever the reagents used, soda, hydrofluoric acid, silver nitrate, etc., do not reveal the characteristic structure; whatever be the heat treatment, it leads to the polyhedric structures with indecisive contours, which are indicated by Figures 5 and 6.

This article will be concluded in an early issue.—Ed.

Spring Winding Tool

Springs made from brass and phosphor bronze wire



HOME MADE TOOL FOR WINDING SPRINGS.

are used considerably in brass shops on special jobs, and sometimes the spring winding, which is a very irksome job, can be made easy if the proper equipment or this simple device as illustrated is used.

In form it is similar to the regular turning tool and can be used in the regular tool-post holder.

The hole A can be any size reasonably near the diameter of the wire to be wound into a spring which it is proposed to wind. As a matter of fact the one holder will take several sizes of wire.

The wire comes through the hole in the direction of the arrow over pin B and under the pin C, and then around the arbor or mandrel which is in place between the lathe centers. As can be seen from the drawing, all that remains to do is to engage the half nuts as in thread cutting and the rest is easy.

One of the difficult problems is to cut the springs to the exact lengths required after they are wound and removed from the mandrel. The best method to employ is to fit up a press with a spiral anvil and adjustable stop to adjust to any desired length. The cut-off tool is inserted in press and set to clear the anvil.—P. W. B.

Melting in a Rennerfelt Electric Furnace

Some Random Notes on Handling Silver, Bronze and Cupro-Nickel from the Viewpoint of the Melter

Written for The Metal Industry by H. D. COLEMAN, Chief Melter, U. S. Mint, Philadelphia, Pa.

It is at times interesting and usually productive of good ideas to those concerned to contemplate some furnace equipment that in no way resembles the outfit under their direct supervision. It occurred to me that while there is nothing radical in the layout of the two Rennerfelt electric furnaces installed at the Mint in Philadelphia, yet some description to the general public may be found worthy of perusal and even furnish food for thought along lines parallel to their own methods.

The question as to the type of furnace must be answered by actual demonstration and tests. It was not contemplated to pour direct into the molds when the first furnace was installed, hence the axis of rotation was not changed from stock pattern, where the center of gravity and turning axis are in same vertical plane. As the lip movement in this case was all of two feet, it was not practical to pour into a fixed height small mouth mold. In this connection we found that horns on the furnace, or bearings for the ladle shank, served the purpose well, and prevented spillage; because of an equidistance being maintained between ladle and lip of furnace. The first furnace installed was rated at 125 kw.—1,000 lbs. hearth capacity, and was used for melting, at different times, standard silver, bronze and cupro-nickel. In using this furnace for silver melting we were enabled to supplant 3.75 gas fires, each of which had a capacity of 81,000 standard silver dollars in 24 hours. In this instance our product of bars weighing 1,000 oz. Troy, having a face area of about 5" x 10".

No alloying of silver was done here, as this was purely an operation to mutilate the coin and make bars of suitable size and shape for convenience in shipping. The charge to this furnace was made up of 17,000 silver dollars, or 306,000 in 24 hours. The molten charge was poured into 16 open molds placed at the periphery of an eight foot turntable about thirty inches from the floor. This turntable was located near the furnace and a chain hoist was suspended from the ceiling at a convenient pouring point, carrying the bail. After filling the ladle, resting in shank supported by horns on the furnace, it was carried by two workmen a few feet and placed in bail at the pouring point. From this position three molds were filled in quick succession, and it required five such efforts to empty the furnace with a consumption of just twenty minutes. As the solidified silver bars reached a position diametrically opposite the pouring point, a pin on a tee handle lever was inserted into a ¾ inch hole through mold grip, and the mold containing bar easily slid to a stationary table, of identical height as the turntable, upon which, by a simple twisting effort, the silver bar was released from mold. The bar was then conveyed to cooling and pickling tubs, after which it was numbered and weighed.

This furnace was continuously in operation for weekly periods until a total of 3,191 heats had been poured. At the end of this work which carried through about eight months of the year the furnace had melted a total of over three million pounds of silver dollars at a power consumption of 177.36 K.W.H. per ton of 2,000 pounds, figuring of course from a cold furnace, which was not actually a fact, even on Monday mornings after a shutdown of 24 hours. The electrode consumption was less than 4 ponnds per ton of metal melted. The roof and cylinder of this furnace lasted throughout the entire period; of course it was necessary to renew the hearth from time to time by tamping in new ganister and fire clay where craters would develop. This furnace was dismantled here, recoveries made of absorbed silver, the furnace relined and used for melting bronze and cupronickel as the dollar melting was at an end.

After using the furnace with success on our several alloys it was decided to equip our melting room with the more modern type: having a centric pouring snout and automatic side electrode control.

The two furnaces now being operated on bronze and cupro-nickel, exclusively, are of one ton and one-half ton hearth capacity, respectively. The installation consists of two 225 KVA transformers, Scott connected, transforming Philadelphia Electric Service of three phase 13,000 volts to two phase 100 volts. Each furnace is provided with 10 and 20 volt inductance in choke coils in series, that can be cut out as more power input is required. The normal working input is 200-225 KW. on the ton, and 100-125 KW. on the hilf-ton furnace. The furnace electrodes (side) are arranged for push button control until the arc is stabilized, when switch is thrown, which puts the motors into operation automatically, requiring very little attention on the part of the operator thereafter. The speed of electrode feed is faster out than in; approximately five inches per minute outward and four inward. The vertical electrode is entirely hand controlled through hand wheel and worm gear needing attention every twenty minutes or so. Besides the in and out movement of side electrodes these furnaces are arranged so that side electrodes may be tilted and thus made to follow the bath of molten metal. The furnaces are lined with silica brick or corundite, with arch of door made of carborundum brick. The door, which is a heavy casting, is lined with tamped-in fire clay and carborundum cand mixed. Special fire brick are being tried from time to time. The punishment here is intense, and all door linings up to date show short service. A life of 50 heats on cupro-nickel would be considered good for this door lining. As our furnaces have been used as much upon one alloy as the other it would be impossible to state the life of the lining if either bronze or cupro-nickel were melted alone. Suffice it to say, however, that on the original run (1,000 lb. furnace) the roof lasted for 800 heats; on the second run the brickwork was not torn out until 1,100 heats had been made, the record being 1,673 heats equally divided between bronze and cupro-nickel. These runs are extremely good and show up well for refractory costs, which on a basis per ton of metal melted will figure less than twenty cents. In renewing brickwork for such a furnace, the roof, the inner cylinder of wedge brick, and ganister hearth must be discarded, but that portion of the lining adjoining the shell of the furnace will last indefinitely. In the particular case just noted, this half-ton furnace after being used for 1,673 melts turned out 443.48 tons of good cupronickel ingots (finished) at a power consumption of 505 K.W.H. per ton figuring in all current used to heat up from cold furnace. And although this result is based on continuous service there were a number of shut-down periods during the time considered. The bronze melted in this same furnace during this long life of lining was 483.40 tons at a power consumption of 301 K.W.H. per ton. The losses are approximately 3/10 of one per cent

which compares closely with our records on crucible melting.

The effect of the upper electrode in depressing and enlarging the intense arc zone of heat, seems to answer the question "Why does not the concentrated effect of the arc temperature do local harm to the metals beneath?"

These furnaces are mounted for direct pour, and it was only after repeated efforts, without success, that we decided a better bar would result with less spillage of metal and greater safety to the workmen if a ladle were used. Besides, for bars weighing no more than 30 pounds, there were too many to melt to make direct pouring practical, as it required double the length of time to empty that was consumed by using two ladles.

Holding back the slag that comes out of the furnace from time to time, particularly when melting cupro-nickel, is quite a problem, and if not held back particles will be entrapped in the mold, making faulty bars that would give trouble ultimately. This difficulty was overcome by using an "under surface pour" ladle which we designed and build here of refractory materials found to best meet our needs. It is not a bottom pour affair, the outlet being about two inches below top, which enables the melter to keep the surface of his melt covered with charcoal, besides preventing any floating matter from passing into the mold. Three hundred pound welded steel bowls are used, the lining being tamped in around a wood form and the special skimming ring of fire brick material (baked) inserted at the upper edge and cemented in place. These ladles are maintained at a high temperature by means of gas burners which provide for distributing the blast in the pot and out through the pouring spout, thus giving the throat a sufficiently high temperature to prevent chilling of metal and clogging of spout. These ladles with proper care will last two weeks or better (24 hours per day) so the expense of the special lining is justified.

Casting Hints

LEAD CASTINGS WITH BRASS INSERTS

For casting lead parts with brass inserts for storage batteries, the best way to handle this work is to tin the brass inserts, by dipping them in a mixture of muriatic acid (usually two parts acid to one part of water), then

LEAD PART WITH BRASS INSERT.

dip in a flux of zinc chloride, and then dip in a bath of 80 lead and 20 tin. There will be no trouble with the lead not adhering to the brass.

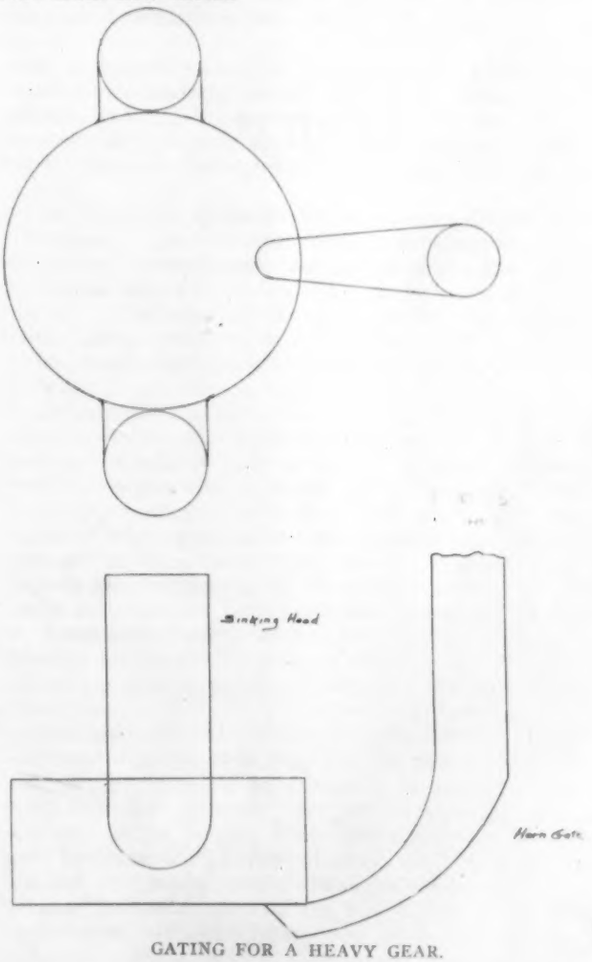
It will probably not be necessary to tin if the inserts are dried after dipping in the zinc chloride.—W. J. R.

CASTING GEARS

A brass foundry foreman reported that he was having continued difficulty in getting solid castings from a pattern for a heavy gear. These castings had to be of heavy brass, solid, and easily machined. He had been using 85-5-5-5 mixture, but had also tried many other mixtures with no better results.

The castings were about 5 in. in diameter and 2¼ in. thick, with five and six slots extending into castings 1¼ in. Castings were poured with about a ¾ in. sprue on one side and large riser on other side. They were poured with sluggish metal, but the tops were always pitted, and when machined the pits extended from ⅛ in. to ¼ in. into face of castings.

There seemed to be one thing sure and that was, the trouble was not in the mixture. However, it might have been in the manner in which the metal was handled. When using crucible furnaces, keep the metal covered with charcoal. When using ingot brass add ¼ lb. 15 per cent phos. copper to the hundred just before pouring. Pour at 2,000 to 2,100 degrees Fahr. They evidently were pouring at approximately 1,900 degrees Fahr. Sluggish metal runs drossy if the mixture is made from new metal.



GATING FOR A HEAVY GEAR.

Melt the copper getting it good and hot—add the lead, the tin, then the zinc and add 25 per cent of 15 per cent Phosphate Copper as a flux. Gate and riser as per sketch and no further trouble will result.—W. J. R.

Brass Foundry Mismanagement

How Too Many Cooks Spoiled the Broth

Written for The Metal Industry by WILLIAM H. PARRY

Considerably less than one hour's ride on the subway from New York City's Municipal Building, is located a brass foundry which is a part of a plant employing 700 souls in the manufacturing of machinery for which there is a never ceasing demand. The reputation of their finished product is of the very best, and this in spite of a badly managed brass foundry where about ninety per cent of the castings used in their product are made. No blame whatever can be placed on the shoulders of the officers of the company in the sense that they are afraid to spend money to buy modern appliances or pay the highest salaries and wages to the factory executives and men. The disease affecting this plant may be termed "Topheavy-executivitis," and the brass foundry is the chief sufferer, because, from the general manager down to the lowest executive on the list, all feel that they and they alone are competent to deal with the many vexing foundry problems that will crop up even in the best regulated foundries in existence. As there are not less than thirteen executives on the staff that comprises this War Board, and they never meet for concerted action as one body, the results can be better imagined than described.

The rank of these executives can be likened to those of our army in that there is one general, some major generals, one or two brigadier generals, a few colonels, a major or two, with enough captains, lieutenants, sergeants and corporals to bring the total up to the fatal thirteen.

One fine day the production manager reported to the general manager, that the weak spot in the organization was the brass foundry, as his investigations and figures proved at least to his satisfaction, that the output of good castings was not equal to the capacity of the machine shop equipment. The general manager started right in to jack up the mechanical superintendent and he in turn hauled the foundry superintendent over the coals for not tipping him off to the deficiencies of his department. The foundry superintendent who happened to be a pretty level headed fellow at times, did not find fault with the foundry foreman because, he thought that their foundry equipment and men were being worked for all "the traffic would bear," but he did suggest the purchase of more modern foundry appliances without knowing just what he really did want, as he was holding the job down not because of his knowledge of brass founding, but through the friendship of the general manager. At any rate, it was decided to send for an expert foundry engineer who manufactured molding machines "on the side," and listen to his advice.

Need I say anything further as to what that advice was? You've said it! He of course advocated the immediate purchase of a battery of his make of machine, and they fell hard for his bunk when he informed them that with his machines, their output would increase from 150 to 200 per cent over that of the machines then in use. To make a long story short, nothing of the kind happened; the output did not increase, and that foundry engineer is very much anathematized by the powers that be, yea, even unto this day.

Prior to our entrance into the war this company decided that there was room in their foundry for a superintendent and placed one in charge there. Among other reforms (?) he was responsible for was the removal of a battery of Schwartz open flame furnaces, and the adoption and use of many pit furnaces in their stead. This genius did not last long, as crucibles shot up in price from 3½ to 22 cents per number and the bad casting percentage did not decrease as he claimed it would by scrapping the Schwartz furnaces (which by the way had been sold to a speculator for a song in the meantime). The next foundry superintendent appointed insisted that they buy Schwartz furnaces, but the best they could do was the purchase of other open flame furnaces, as the deliveries on the Schwartz type at that period could not be named, the demand being too heavy for the manufacturer.

Recently it was observed that a certain small part of their machines were showing symptoms of spotted fever, or rather porosity, and as the "War Board" was in excellent health and going strong, every member took a hack at the problem. The casting in question weighed but a few ounces, and a fair amount of them were sprinkled on a round plate about 1½ inches in diameter with two deep stanchions on one side and a center boss on the other. As the stanchions or posts were twice the height of the center boss it was arranged to cast them with that side down as it was feared that the metal would not fill if the posts were in the cope. This was a perfectly logical conclusion, but the center boss being about ⅝" in diameter and height and the plate thickness ⅛ inch, porosity was in evidence at the base of the boss on many of the castings. The production manager having once worked in a malleable iron foundry, insisted that the only sure cure for porous castings was to use chills on the surfaces affected, and the adoption of this plan was halted only when they realized what the cost would be of making, maintaining at least 500 chills meant to subdue the "fever" in the castings. I might add that this was a clear case of "Chills and Fever." Among the many cures suggested were the changing of the gate positions, a bigger runner, a smaller runner, risers from each casting, a riser at the end opposite the sprue, newer metal, older metal, changes in the mixture, phosphor copper, phosphor tin, bigger billets, and deoxidizers of all kinds excepting tutti-frutti. Almost all of these cure-alls were tried and found wanting in one way or another, which stood the War Board on its head, as the castings with devilish persistency did not take kindly to these treatments.

In the meantime the foreman of the foundry had been lost in the shuffle, ranking only as a sergeant, as he merely made the castings. He had nothing to do with the planning of how many patterns should be placed on a plate, and such trifles as the proper gating, size of runner, draft, sizes of gates, and their proper position, etc. In sheer desperation he was asked his opinion and gave it. And do you know that when they woke up to the fact that he was the only real foundryman on the War Board he escaped court martial because the castings would persist in being sound after the pattern plate had been altered to suit him.

The personnel of the War Board is as follows: General manager, General Superintendent, Production Manager, Mechanical Superintendent, Foundry Superintendent, Chief Engineer, Chief Draftsman, Metallurgist, Foundry Foreman, Foreman of Molding Machine Operators, Foreman Coremakers, Foreman Patternmaker, Foreman Toolmaker.

It's a great life if you don't weaken, mates.

Fuels for Brass Melting

An Explanation of the Need For Careful Thought Before Installing Furnaces

The fuel question is one that is demanding a great deal of attention at the present time, due to economic readjustments affecting the uses of different fuels, transportation difficulties, etc. The nations are engaged in a scramble for sources of supply of fuel oil, owing to the economic advantages it offers on ship board. This bidding and contracting for oil for marine and naval uses has sent the price up enormously, and the indications are that oil for industrial heating must give way for the time being to a less essential fuel.

The best fuel for melting brass or for any other purpose for that matter, is that which will give the best quality product for the least manufacturing cost; and it should always be remembered that it is not the fuel cost but the cost per pound of brass melted that is the criterion.

Coal and coke, with the pit type furnaces, are the old standby of the brass industry, and most of the brass produced in the country today is melted in this manner. The results obtained are eminently satisfactory as far as flexibility, reliability and quality of product are concerned. For the small installation in the foundry and for small heats of special mixtures where great flexibility is required, coal and coke pit fires are most satisfactory and inexpensive. The investment required in pit, coal or coke brass melting furnaces is less than with any other; also there is still an open question if this is not also the case in the large casting shops and brass mills.

In considering the question of brass melting furnaces, attention should be given to the design and construction of the furnace, whatever type of fuel is used. Thus, for example, there are well designed coal furnaces and badly designed coal furnaces; well designed gas furnaces and badly designed gas furnaces, and it is not reasonable, for instance, to compare the well designed coal with the badly designed gas furnace. It is quite common to lay particular stress on the fuel used and to group furnaces according to fuel, so that we find general references to "gas furnaces," "coal furnaces," "electric furnaces," etc., with little or no regard for the design and construction of the furnace.

Oil is a most desirable and easy fuel to handle, but at the present time it is expensive and hard to obtain and the present rate of consumption indicates greater future scarcity and much higher prices, so that it is inadvisable to install equipment requiring large quantities of this fuel.

City gas is not so expensive when its satisfactory work is considered and bearing in mind the fact that it is not fuel cost, but the cost of the finished product that counts we find that brass can be melted as cheaply with city gas as with coal and coke if all the factors are considered. Among those factors may be mentioned:

1. Less labor required to operate the furances with gas.
2. Longer life of crucibles.
3. No ashes to handle or treat.

These factors are of the greatest importance and obtain with all types of gas fuel in crucible furnaces. Careful consideration shows the use of gas to be economical and satisfactory in brass melting practices. All of the advantages of the crucible method of melting with its flexibility and ease of control are retained, with a great reduction in cost over the coal fired furnace. For example, few people realize that brass can be melted cheaper by using **city gas at 80c. per M** than with anthracite coal and coke. In this case, the difference in the price of fuel is more than counterbalanced by the great saving possible in labor and ash treating, etc., and by the greater speed in melting.

The available fuels may be listed as follows:

Coal.
Coak.
Fuel oil.
City gas.
Producer Gas.
Water Gas and various similar types of manufactured gas.
Natural gas.
Electricity.

The questions that immediately come to the mind of the prospective purchaser of equipment is "What gas shall I use in my crucible furnace" and "Shall I make it or buy it?" Obviously for the small installation, gas must be bought, either city gas from the local gas works or some form of manufactured gas from producers in other plants in the district.

Manufactured gas can be used to great advantage in crucible melting and by many is regarded as much more satisfactory than either oil or natural gas because of the lesser tendency to oxidize the carbon in the pots.

The abundance and cheapness of natural gas, oil and coal in America has retarded the development of processes and equipment for the economical production of fuel, and the economic use of coal through the production of coke and gas as practised in Europe is but little known and realized. In view of the greatly increased cost of fuel in all forms in the United States, development along the lines indicated present enormous possibilities.

The problem might be termed one in "Metallurgical Economics." Comparing brass melting with gas and brass melting with electricity, for instance, it is necessary to determine:

1. Whether it is cheaper to burn coal to produce electricity, which is in turn used to produce heat; or to produce gas and by-products, and use the gas for heating.

Because of the high cost of electrical power and the enormous cost of the electric furnace, no matter what make, and also the fact that the electric furnace for melting of non-ferrous metals is yet in the experimental stage, it is unwise to consider the installation of that form of melting without a very exhaustive study of the subject. One contemplating such an installation should fortify his judgment with the most accurate information as to melting costs based on practice and not theory.

Another factor to be considered in connection with the use of gas in crucible brass melting is the fact that the same gas can be very profitably used for annealing and heat treating furnaces in the same plant, and so this also opens up further the vast economic features possible in the use of gas fuel in the world's future metal melting industry.

Zinc Uses

The rotating cylinders of many leading washing machines, now rapidly becoming a necessary adjunct to the American home, are made of rolled zinc. This material does not rust and, therefore, permits clothes being cleaned without discoloration.

Almost one-half of the compound of the best automobile tires on the market today is lead-free zinc oxide. This filler gives the tire its white color and resiliency and increases its tensile strength and durability.

Die Castings

A Paper Presented at the Spring Meeting, St. Louis, Mo., May, 1920, of The American Society of Mechanical Engineers.

By CHARLES PACK, Secretary, Doehler Die Casting Company

The die-casting process, according to the author, is best adapted to alloys of comparative low fusing points, such as those of zinc, tin, lead and aluminum. While it is stated that no general rules can be laid down governing the design and application of die castings, the paper nevertheless outlines the general properties of the various alloys used and their fields of application and gives particulars regarding such limitations as maximum weight of casting, minimum wall thickness, minimum number of threads and minimum diameter of holes that can be cast, draft for cores and side walls, etc.

Die castings may be defined as castings made by forcing molten metal, under pressure, into a metallic mold or die. It is erroneous to assume that all die castings have similar properties, since it is apparent that the properties of the die casting will depend upon the nature of the alloy used. The die-casting process is best adapted to alloys of comparatively low fusing points which may, for convenience, be divided into the following groups:

Group A Zinc Alloys, consisting essentially of zinc alloyed with tin, copper or aluminum.

Group B Tin Alloys, consisting essentially of tin alloyed with copper, lead, or antimony.

Group C Lead Alloys, consisting essentially of lead alloyed with tin or antimony.

Group D Aluminum Alloys, consisting essentially of aluminum alloyed with copper.

2. No general rules can be laid down governing the design and application of die castings since the art depends largely upon the skill of the designers, and quite frequently a part may be considered as impractical from a die-casting standpoint which, if measured by given standards, may be redesigned and die-cast very successfully. Nevertheless, the writer will endeavor to outline briefly the general properties of the alloys used, their fields of application and their limitations.

GROUP A—ZINC ALLOYS

3. **Typical Alloy.** A typical zinc alloy for die castings is that whose composition is given below, together with particulars regarding its general properties and the casting limits which must be observed.

Zinc	87.5 per cent	Copper	4.0 per cent
Tin	8.0 per cent	Aluminum	0.5 per cent

Properties:

Color	Silver white
Weight per cu. in	0.253 lb.
Melting point	780 deg. fahr.
Initial fusing point	275 deg. fahr.
Tensile strength	16,160 lb. per sq. in.
Elongation	2 per cent
Compressive strength	27,670 lb.
Pressure required to shorten bar 1 in. diam.	10 per cent
Hardness number (Brinell)	64.6

Casting Limits:

Maximum weight for casting	8 lb.
Minimum limit of wall thickness	1/10 in.
Small castings	1/16 in.
Variations from drawing dimensions per inch of diameter or length	0.001 in.
Cast Threads (minimum number):	
External	24 per inch
Internal	depends on conditions, often cast
Cast Holes: minimum diameter	0.031 in.
(Depends largely upon the depth and thickness of casting.)	
Draft: Cores, 0.001 in. per inch of length or diameter. Side walls, 0.001 in. per inch of length.	

4. **General Design.** Sections of castings should be as uniform as possible. Sharp corners should be avoided and fillets added wherever permissible. Undercuts in castings should be avoided wherever possible.

5. **General Remarks.** Alloys of this type are corroded by any alkaline or aqueous solutions of any salts. Castings may be polished to a high luster, but soon tarnish when exposed to ordinary atmospheric conditions. Castings made from this alloy may be readily plated with nickel, copper, brass, silver, or gold. When properly plated such castings will retain their luster as well as those made from brass or bronze.

6. **Applications.** Castings made from this alloy should not be used for parts that are subjected to severe stress or sudden shock in service. They are used extensively for parts of phonographs, calculating machines, drinking-cup, cigar, candy, stamp and gum vending machines, magneto housings, automobile-body trimmings, pencil-sharpening machines, time-recording devices, stamp-affixing machines, and for many other devices of a kindred nature.

GROUP B—TIN ALLOYS

7. **Typical Alloys.** The five compositions given below are typical die-casting alloys of the tin group:

	Tin Per Cent	Copper Per Cent	Lead Per Cent	Antimony Per Cent
No. 1	90	4.5	0	5.5
No. 2	86	6	0	8
No. 3	84	7	0	9
No. 4	80	0	10	10
No. 5	61.5	3	25	10.5

8. Alloy No. 1 is a so-called "genuine babbitt" metal and was used very extensively during the war for mainshaft and connecting-rod bearings on all American-made aeroplanes and motor trucks. No. 2 is somewhat harder and is used extensively for bearings in internal-combustion engines. No. 3 is somewhat harder than alloy No. 2 and is the S. A. E. standard for high-grade internal-combustion-engine bearings. No. 4 is in general use for light bearings on stationary motors. No. 5 is a bearing metal for light duty and is used on a large number of moderate-priced automobiles for mainshaft and connecting-rod bearings.

9. In addition to the five compositions mentioned, hundreds of similar alloys may be made having various specific properties. A study of these alloys, however, would prolong this paper unduly, and in the opinion of the writer, is beyond its scope. The die-casting process, it may be said, is applicable to any of the alloys of this group and it may be left with the engineer to specify the alloy best suited to his requirements.

General Properties:

Maximum fusing point.....450 deg. fahr.
Weight per cu. in.....depends on lead content

Casting Limits:

Maximum weight for casting.....10 lb.
Limit in wall thickness.....1/32 in.
Variations from drawing dimension per inch of diameter or length.....0.0005 in.
Cast Threads, minimum number:
External .....27 per inch
Internal .....depends on conditions, often cast
Cast Holes: minimum diameter.....0.031 in.
(Depends on depth and thickness of casting)
Draft: Cores, 0.0005 in. per inch of length and diameter.
Side walls, 0.001 in. per inch of length.

10. **Applications.** Tin Alloys find their largest field of application in their use as bearings for internal-combustion engines. They are also used for parts of soda fountains, cream separators, milking machines, surgical apparatus, galvanometer's parts, player pianos, etc., where a tensile strength of over 8,000 lb. per sq. in. is not essential and where resistance to corrosion is of importance. They are not affected by water, weak acid, or alkaline solutions, and when free from lead, are extensively used for food-container parts.

GROUP C—LEAD ALLOYS

11. **Typical Alloys.** The following four compositions are those of lead alloys widely used in the production of die castings:

	Lead Per Cent	Tin Per Cent	Antimony Per Cent
No. 1	83	0	17
No. 2	90	0	10
No. 3	80	10	10
No. 4	80	5	15

General Properties:

Weight per cu. in.....depends on lead content
Maximum fusing point.....600 deg. fahr.

Casting Limits:

Maximum weight for casting.....15 lb.
Minimum wall thickness.....1/32 in.
Variation from drawing dimensions per inch of diameter for length.....0.001 in.
Cast Threads, minimum number:
External.....24 per inch
Internal.....depends on conditions, often cast
Cast Holes: minimum diameter.....0.031 in.
(Depends on depth and thickness of casting)
Draft: Cores, 0.0005 in. per inch of length and diameter. Side walls, 0.001 in. per inch.

12. Alloy No. 1 is generally known as C. T. (Coffin Trimming) metal, due to its extensive use in the manufacture of coffin trimmings. This alloy is also a good bearing metal for light duty and is employed for thrust washers and camshaft bearings on light internal-combustion engines. No. 2 is somewhat softer and more ductile than No. 1. No. 3 is much used for light bearing duty, being somewhat tougher and stronger than Nos. 1 and 2. No. 4 is somewhat harder than No. 3 but less ductile. Many similar alloys may be compounded, all of which may be die-cast readily.

13. **Applications.** Lead alloys may be used where a metal of non-corrosive properties is desired and where a tensile strength of not over 8,000 lb. per sq. in. will suffice. They are used extensively for fire-extinguisher parts, low-pressure bearings, ornamental metal-ware, and many parts that come in contact with corrosive chemicals. They should not be used for parts that may come in contact with foods or that may be handled often in service, since the poisonous properties of lead and lead alloys are well known.

14. The main advantage of these alloys lies in their comparatively low cost, but their high specific gravity must be considered, some lead alloys having a specific gravity double that of the zinc alloys.

15. During the war lead alloys were used for all hand-grenade fuse parts and many millions of these parts were made. Lead-alloy die castings were also used for thermite grenades, offensive grenades, trench-mortar fuse plugs and many other parts where a non-corrosiveness was an essential requirement.

GROUP D—ALUMINUM ALLOYS

16. **Typical Alloy.** A typical aluminum alloy for use in die-casting work has the following composition: Aluminum, 92 per cent; Copper, 8 per cent.

Properties:

Colo .....Silver white
Weight per cu. in.....0.115 lb.
Melting point.....1150 deg. fahr.
Tensile strength.....21,000 lb. per sq. in.
Elongation .....1.5 per cent
Hardness number (Brinell).....60.5

Casting Limits:

Maximum weight for castings.....5 lb.
Minimum wall thickness.....1/16 in.
Variation from drawing dimensions per inch of diameter or length.....0.0025 in.
Cast Threads, minimum number:
External.....20 per inch.
Threads are cast oversize 0.01 in. to be chased to size.
Internal threads rarely cast.
Cast Holes: Minimum diameter 0.093 in. and not deeper than 1 in. Larger cores may be cast much deeper; smaller holes may be spotted to facilitate drilling.
Draft: Cores, 0.015 in. per inch of diameter or length. Side walls, 0.005 in. Cores of less than ¼ in. diameter to have 0.005 in. draft per in. of length and diameter.

17. The composition described above is well known in the arts as No. 12 alloy and is used very extensively for automobile and aeroplane parts. By varying the copper content harder or softer alloys may be obtained, all of which may be die-cast successfully.

18. **Applications.** Aluminum die castings find wide employment in the manufacture of parts of automobiles, such as spark and throttle control sets, magneto parts, battery ignition and lighting systems, speedometers, etc. They are also used for parts of vacuum sweepers, phonographs, milking machines, vending machines, etc.

BRASS AND BRONZE DIE CASTINGS

19. Die castings made from various types of brasses and bronzes were put on the market as early as 1910, but have never been successful commercially. At the present time there is only one die-casting manufacturer producing brass die castings in any appreciable quantity.

20. It is a comparatively simple matter to produce a small quantity of sample brass die castings, but no material has yet been found for die-making purposes, which will withstand the continuous action of molten brass and at the same time retain its shape, surface and size. The die casting of brass and bronze must be considered as in the experimental stage at the present time, with little or no immediate prospect of the solution of the problem.

Analysis of Plating Solutions

A Description of the Gallon Assay Method or Volumetric Analysis. Part 1.

Written for The Metal Industry by JOSEPH HAAS, Jr.

ANALYSIS IN GENERAL

The reasons of why plating solutions should be run on an analytical basis have been discussed to such a great extent that it is unnecessary to relate them here. However, the different methods of analysis will be briefly discussed. Plating solutions can be analyzed in any of three ways. The gravimetric method depends on precipitating an insoluble salt, from which, after the salt has been washed, dried and weighed, that which it is desired to know can be calculated. This method has its avantages, if extreme care is taken, but repeated weighings necessary make the work tedious. Electro-analysis is ideal for the plater because it is electro plating on a small scale. Volumetric analysis depends on knowing the value of each cc of a certain solution in terms of what it is desired to determine. The calculations are few and simple. The solutions are called Standard Solutions. In fact, after the solutions are once made up, no calculations are necessary. It is the purpose of this article to explain how calculation are to be avoided. Volumetric analysis in conjunction with electro analysis will give uniformity of results. For accurate results one method of analysis should not be depended upon, as no matter how many duplicates one makes, if the results agree, the conclusion reached is not that the results must be true. One may and often does make the same errors time and time again, if so a check is run by a different method, the error will be detected and corrected. This paper is not written with the purpose of explaining volumetric analysis to those who have not that knowledge, but rather to explain a simpler method to those that have the knowledge. For this reason description of various apparatus has been omitted as unnecessary.

POSSIBLE ERRORS OF MANIPULATION

For the purpose of increasing the accuracy of the results to be obtained a list of possible errors, and the method of avoiding them will be given. Such errors as are due to splashing, improper rinsing, or filtering are due to carelessness and nothing can be done to decrease them if the worker himself is not careful. The following errors are likely to be made unless one keeps them continually in view. In carrying out a determination errors of various kinds are possible. The two chief sources are constant errors that are due to some error in the apparatus, or to the neglect of certain factors that exercise a appreciable effect, and accidental errors or errors of observation. In the case of constant errors the different values of a determination may differ by a very small amount from one another, but may differ also by a very large amount—the deviations may all be in the same direction from the true value. It is evident that increasing the number of determinations will not in such a case increase the accuracy of the result; and to exclude the constant errors, it is necessary to vary the method of the determination. In the case of errors of observation, the results may vary in either direction from the truth, or in other words may have a positive or a negative value. Thus in volumetric analysis, burette readings may be: 31.26, 31.25, 31.24, 31.26, 31.27, 31.26. We would have to decide which of the values between 31.24-31.27 is the nearest to the truth. In such a case the arithmetical mean is the best representative.

Balancing and Weighing Errors. The determination of the weight of an object is capable of the highest accuracy. Therefore, to avoid errors in weighing, one must know how to determine the Zero Point of the balance, the Sensitiveness, and how to calibrate the weights.

Errors of Measuring Apparatus. The apparatus used in measuring out solutions must always be clean. The three essential pieces of apparatus being the pipettes, flasks and burettes, that they may always deliver their true volume, they should be cleaned with a warm solution of sodium hydroxide, rinsed in water, and then washed with a solution of potassium dichromate in conc. sulphuric acid. This will remove all grease and organic matter.

Calibration of Apparatus. For volumetric work the flasks (100, 500, 1000, 2000) the pipettes, and the burettes are so constructed as to deliver their definite volume of liquid at a definite temperature—18 Centigrade degrees. Therefore it can be readily seen that if the temperature at which the apparatus is used is different from that which it has been standardized at, the volume of the solution will also be slightly different. However, a corner of the plating room can always be found for a laboratory where the temperature all year run is close to 18 degrees C. and the variation in volume is so small that results accurate to the first decimal point can be obtained, without calibrating the apparatus, but taking it for granted that the volume marked on the apparatus is being delivered. This conclusion has been reached by making volume corrections for difference in temperature in carrying out one set of determinations. Then another set of determinations were run and no volume corrections were made. The results coincided to the first decimal point. Both results were checked up against an electrolytic analysis, giving the same result to the first decimal point. Thus it is seen that to avoid increased errors with apparatus, care must be taken in making and measuring out solutions.

In making reading of volume by means of burettes, if the line of vision is raised or lowered, the apparent position of the meniscus changes. Owing to this apparent change of position, such volume readings are liable to considerable errors, and since there are sufficient errors in our apparatus, such an error as reading of volume is to be avoided. With those burettes that are lined with a blue strip in the back, the error is avoided by raising or lowering the line of vision, until the meniscus and its image coincide. With burettes that have no blue strip, the same result is obtained with a mirror held in back of the burette. Precaution also must be taken in making up the standard solutions, that the flask is setting upon a level surface; that the solution is allowed to cool to room temperature before it is made up to the mark.

Errors in Standard Solutions. It is upon the accuracy with which the standard solutions are made and the care that is taken to maintain them uniform that accurate results will be obtained. The solutions must be kept in thoroughly clean bottles, fitted with ground glass stoppers; some solutions must be kept in dark bottles to prevent decomposition by light. The exact weights of the various salts must be taken as given in the table below.

METHOD OF ANALYSIS

The method of analysis to be followed depends upon making standard solutions in accordance with Prof. E. J. Hall's Assay Gallon. This method has been described and explained in THE METAL INDUSTRY, Vol. 12, page

466. The pipettes used deliver 12.2 cc and 13.4 cc for Troy and Avoirdupois determinations, respectively. These will be made and calibrated by any chemical supply house. Prof. Hall has recommended that solutions be made of such a strength that 1 cc of the solution would be equivalent to 1 decigram of what is desired to determine. Then the readings on the burette would numerically equal to Troy or Avoirdupois ounces. But solutions of such strength are difficult to handle, as the possibility of errors is greater, the greater the concentration of the solution. Consequently it is recommended that the solutions be made of such a strength that 1 cc will be equivalent to 0.1 decigram or 1 centigram of whatever is to be determined In this way 10 cc on the burette will numerically equal 1 ounce Troy or Avoirdupois per gallon. Each cc can be read to one hundredths of an ounce. There is no necessity of standardizing the solutions if care is taken in making up the solutions, and if they are made up with only the purest chemicals. These chemicals should be carefully put away after being properly stoppered up.

The best method to obtain accuracy in volumetric analysis is to follow a method as here given: Run the titrating solution in at 2 cc bulks, and find the extreme limits between which the end point lies. Suppose that at 8 cc the end point is not visible, but at 10 cc it is. Then the end point lies between 8 and 10 cc. Then taking another sample of the solution 8 cc are run in directly, and from there on the solution is titrated drop by drop. If a method such as this is followed, it will be found that overrunning the end point will be avoided, and much tedious and unnecessary work will be eliminated. Following is a table of the various solutions to be analyzed, with what chemical, and with what indicator. The table should be posted in a convenient place where the analytical work is carried on:

SOLUTION ANALYZED	FOR	WITH	GRAMS PER LITRE	INDICATOR	REMARKS
Silver	Ag	NaCNS	7.49	Ferric Alum	
	CN	$AgNO_3$	32.65	KI	Keep in dark bottle
Copper	Cu	NaCN	30.88	NH_4OH	32.145 grams of 96% NaCN is used. Keep in dark bottle.
		or			
		$Na_2S_2O_3.5H_2O$	39.03	Starch paste	
	Acid	Na_2Co_3	10.81	Methyl Orange	
	CN	$AgNO_3$	32.65	KI	Dark bottle
Zinc	Zn	$K_4Fe(CN)_6.3H_2O$	43.05	Ammonium molybdate	
	Acid	Na_2CO_3	10.81	Methyl Orange	
	CN	$AgNO_3$	32.65	KI	Dark bottle
Brass and Bronze	Analyzed for Cu, Zn, and free CN with the same solutions as used for copper and zinc.				
Nickel	Ni	NaCN	33.41		34.802 grams of 96% NaCN is used.
		&		KI	
		$AgNO_3$	57.90		
	Cl	$AgNO_3$	47.89	K_2CrO_4	
Gold	Au	$Na_2S_2O_3.5H_2O$	25.15		
		&		Starch paste	
		I_2 dissolved	12.86		
		in KI	25.00		
	CN	$AgNO_3$	32.65	KI	
Lead	Pb	$Na_2S_2O_3.5H_2O$	35.94	Starch paste	
Sulpho-Cyanate Black Nickel	Ni	NaCN	33.41		34.802 of 96% NaCN is used
		&		KI	
		$AgNO_3$	57.90		
	Zn	$K_4Fe(CN)_6.3H_2O$	43.05	Ammonium Molybdate	
	CNS	$AgNO_3$	29.35	Ferric Alum	
Arsenic	As_2O_3	I_2	25.65		
		dissolved in KI	50.00	Starch paste	

ANALYSIS OF SILVER SOLUTIONS

1. **Determination of silver with NaCNS.** The method depends upon the fact when an acid solution of silver and alkaline thio-cyanates are mixed in the presence of ferric sulphate or ferric alum, so long as silver is in excess, the thio-cyanate of silver is precipitated, and any brown ferric thio-cyanate that is formed is decomposed. The end point is reached when the solution turns faint brown colored, showing that all the silver has been removed. The method may be used in the presence of copper up to 70%, also Antimony, Iron, Zinc, Manganese, Lead, Cadmium, Bismuth, Cobalt, and Nickel unless in such proportions as to interfere by intensity of color.

(a) Ppt.as Ag_2S. 12.2 cc of the silver solution are taken and diluted to 100 cc and heated to a boil. Then ppt. Ag2S with H_2S, and after precipitation is complete, filter. The precipitate is dissolved with HNO_3, boiled to expel nitrous acid fumes, cooled and diluted to 100 cc. Two drops of indicator (10% ferric alum) are added. The solution is now titrated with the standard NaCNS.

(b) Decomposition of Cyanides. 12.2 cc of the solution are taken and H_2SO_4 is added to ppt. and decompose the cyanides, and when solution is complete, the indicator is added, and the solution titrated.

Sample calculation:

23.5 cc NaCNS solution used in titration.
Since 1 cc NaCNS = 0.1 decigram Ag.
23.5 cc NaCNS = 2.35 decigram Ag. = 2.35 ozs. Troy per gallon.

NOTE—By moving the burette reading, one decimal to the left ozs. per gallon are read off.

2. **Determination of free cyanide with $AgNO_3$.** The method depends upon the fact that when a solution og $AgNO_3$, is added to a solution that contains uncombined cyanide and a little KI as an indicator, as long as there is any uncombined cyanide, the precipitated AgCN and AgI first formed are redissolved, and the complex soluble cyanides formed. The end point is reached when all the free cyanide is used up, the solution turns a faint canary yellow. Dilute 13.4 cc to 100 cc and add two drops of 10% KI and then titrate with the standard $AgNO_3$ solution until a perceptible turbidity is formed. This is the end point.

Sample calculation.

12.2 cc $AgNO_3$ solution used in titration.

Since 1 cc $AgNO_3$ solution = 0.1 decigram CN
12.2 cc $AgNO_3$ solution = 1.22 decigram CN = 1.22 ozs. avoird. CN per gallon.

To convert CN to NaCN multiply by 1.884; to convert to KCN multiply by 2.503.

ANALYSIS OF ACID COPPER SOLUTIONS

1. **Determination of Copper with NaCN.** The method depends upon adding to a slightly acid or neutral solution, NH_4OH to the form the deep blue characteristic color of the ammonium copper ion. By adding NaCN, this color is destroyed by the decomposition of the complex copper ammonium to form the complex salt Na Cu $(CN)_2$. When the last of the copper ammonium ion is is decomposed, the blue color disappears. Take 13.4 cc of the copper solution. If the solution is strongly acid add 10% NaOH to nearly neutralize the acid and then add NH_4OH until the precipitate first formed dissolves making a dark blue solution. If the solution is not strongly acid the NH_4OH may be added directly. The solution is then diluted to 100 cc and titrated with the standard solution. The end point is a faint violet color which may disappear upon standing.

Sample calculation.
34.7 cc NaCN solution used in titration
1.0 cc NaCN solution = 0.1 dec. Cu
34.7 cc NaCN solution = 3.47 dec. Cu = 3.47 ozs. Avoid. Cu per gallon.

2. **Determination of Copper by Iodide Method.** The method depends upon the fact that when KI is added to a slightly acid solution, cuprous iodide is precipitated and a chemically equivalent amount of iodine is liberated. This liberated iodine is tritated with standard $Na_2S_2O_3$. Since the tritated iodine is chemically equivalent to the Cu, the value of each cc of $Na_2S_2O_3$ is expressed in terms of Cu. To 13.4 cc of the copper solution, NH_4OH is added until a faint precipitate is produced. The precipitate is then dissolved with a minimum $HC_2H_3O_2$, and then 5 cc in excess. Add 10 grams of KI taking care that all KI is dissolved before proceeding with the titration. Dilute to 100 cc, and titrate the solution with the standard "hypo" solution until the brown coloration of the iodine changes to yellow. At this point add a few drops of starch solution, and the entire solution will now be colored blue. The titration is continued until this blue color is discharged.

The Conclusion of this article will be published in an early issue.—Ed.

Plating White Metal

Operations Performed in Finishing Lighting Fixtures of Antimonial Lead

Written for The Metal Industry by CHARLES H. PROCTOR, Plating-Chemical Editor

Most white metal castings so termed are made of antimonial lead, and the methods of polishing are simple. A good tripoli composition will be found the best medium for polishing. Keep the buff wheel slightly moistened with a little kerosene. An emery paste composition put up in stick or cake form is frequently used.

After polishing, wash the excess of polishing composition from the castings with benzine or gasoline. Dry the excess by the aid of sawdust, preferably maple.

After above operations have been completed and just before plating, cleanse in hot alkali solution 200 deg. Fahr. Any of the cleaners advertised in THE METAL INDUSTRY may be used to advantage or the following formula may be used:

Water	1 gallon 200 deg. F.
Soda Ash 58%	2 oz.
Caustic Soda 76%	3 oz.
Powdered Rosin	¼ oz.
Sodium Cyanide	¼ oz.

Immerse for a short time, being careful that the castings do not run dark from too long an immersion. Remove, wash thoroughly in cold water and then immerse in a cyanide dip composed as follows:

Water	1 gallon
Sodium Cyanide 96.98%	6 oz.

Rewash in cold water and plate in a cyanide copper solution prepared as follows:

Water	1 gallon
Sodium Cyanide	4 1/3 oz.
Copper Cyanide	4 oz.
Bi-carbonate of Soda	2 oz.
Bi-sulphite Soda	½ oz.

Temperature 140 to 160 deg. Fahr. Three volts.

After plating for about five minutes remove, wash thoroughly, and plate in the acid copper solution for from 30 minutes to one hour prepared as follows:

Water	1 gallon
Copper Sulphate	1½ lbs.
Sulphuric Acid	4 oz.
Powdered Alum	1 oz.
Black Molasses	⅛ oz.

Temperature normal at 1 volt.

After plating the castings may be scratch-brushed for a lustre or acid dipped in the usual acid dip solution prepared as follows:

Nitric Acid 38%	1 gallon
Sulphuric Acid 60%	1 gallon
Water	1 pint
Muriatic Acid	1 ounce

The acid dip must be always kept cold by surrounding the receptacle with cold running water.

After copper plating immerse the articles in the acid dip, dry for second. Then remove, wash in cold water thoroughly and the articles are ready for brass or silver plating as desired.

The formula for the brass solution should be as follows:

Water	1 gallon
Sodium Cyanide	5¾ oz.
Copper Cyanide	4 oz.
Zinc Cyanide	1 1/3 oz.
Soda Ash	2 oz.
Sal Ammoniac	½ oz.

Temperature 80 deg. Fahr. at 3 to 3½ volts.

After brass plating for 20 to 30 minutes, finish in brush brass or as desired.

For silver plating the following formula may be used:

Water	1 gallon
Sodium Cyanide 96.98%	2 oz.
Silver Cyanide 80½%	1½ oz.
Caustic Potash	⅛ oz.

Temperature normal at 1 volt. Use anodes of the respective metals in solution.

As a brightening agent for silver use 2 grains of Bisulphide of Carbon per gallon of solution, previously dissolved in ½ ounce of the silver solution, to which is added ⅛ oz. sodium cyanide.

Cleaning As An Essential Manufacturing Operation

An Article Which Won the Fourth Prize in the Contest Held by The Oakley Chemical Company

By BENJAMIN W. GILCHRIST

All manufacturing operations should be classed as essential that are conducive to uniform results, primarily because they are more economical and enhance the durability and beauty of the finished product. Especially is this true where close competition must be met by the sales department and an order for a product taken or lost when its attractiveness and wearing qualities of the finish are compared with another.

As cleaning is the cornerstone upon which the result of all plating rests, it is evident that it is of paramount importance, and as the standardizing of solutions and finishes grows more exacting, the need for a perfect cleaner becomes more and more imperative.

To meet this situation, the business of perfecting cleaning compounds and methods has grown by leaps and bounds within the past few years and there is hardly a situation that can arise where the plater has not at his command all the latest data obtainable through those whose many and varied experiences have made them equal to any cleaning problem that may be propounded to them.

It is a far cry from the haphazard and slipshod methods of the past to the analytical knowledge of today, not only as to the ingredients that compose a cleaning bath, but also the manipulation and care that are necessary to obtain full efficiency. There are many who can readily recall the big hogsheads of lump potash that one had to break up with a crowbar after the potash had stood exposed to the air for a few days, and the muss that followed as a result of it. Instead of the addition of two or four ounces of cleaning compound to a gallon of water, it was no unusual thing to throw potash into the tank by the pailful, the pail being used as a unit of measure. Sore hands and profanity were the rule and not the exception, while tarnished surfaces and cloggy deposits made of many a day a nightmare.

Less than twelve years ago, the cleaning of steel ribbon in the ——— Company was done in a saturated solution of cyanide with a reverse current. From this a poisonous spray arose, filling the room and settling in the form of a white powder on the tanks and surrounding articles; disease and death lurked in every breath. Surely here was a broad field for those who sought a remedy for such dangerous, crude, and expensive methods, and how well they have succeeded, marks one of the greatest steps in efficiency that has been developed in the plating industry.

Comparison with the statement of one of the highest authorities of twenty years ago (Dr. George Langbein's "Elect. [illegible] position of Metals," Second Edition, page 130, wherein the subject of removing grease from articles previous to plating is dismissed with a single paragraph) and the exhaustive articles and pamphlets on the subject that are now available, gives one some conception of the importance now attached to the subject, which shows conclusively that cleaning, instead of being a simple operation, has become a vital engineering proposition. Through extensive studies, cleaners have been developed that will work satisfactorily on all metals; but no one solution will produce the best results unless made up in proportions to fit the work in hand. A solution that will clean brass perfectly may be entirely unsuited for steel parts that come to the plater with oil and buffing composition imbedded in the corners or crevices, and while experimenting will determine the proper proportions of cleaning compound required, it may be more quickly ascertained by inquiring of those who make cleaning their specialty.

Cleaning, then, having been recognized as an essential manufacturing operation, the question of selecting a material that will meet requirements becomes of vital importance. So it follows that, First: It must remove all dirt and oils thoroughly; Second: It must not affect the beauty of the finish; Third: It should work quickly and uniformly—with or without an electric current; Fourth: The cost of upkeep, judged from the amount of work it will produce—pound for pound—as compared with others, must be carefully and accurately determined and kept to a low figure.

The above data having been carefully worked out by the plating department, the co-operation of the purchasing agent should be secured, for in many factories it has been the custom of the purchasing department to look only at the first cost in dollars, and select the cheapest material without considering the amount of or quality that a pound will produce in finished satisfactory work. No reliable producers of cleaning compounds will hesitate to meet any test that may be imposed. In fact, it is the one favor they usually ask.

How different were the days when the weather conditions were offered as an excuse for defective deposits, when the cleaning was really at fault! Happily those days of guesswork are past. With a standard cleaner, worked under the instructions furnished by the manufacturer and carefully followed, the cause of defective work must be sought and found at some other point, such as the current, or the amount of free cyanide in the plating solution, which, through electrolysis, is constantly undergoing changes.

The question of whether or not to use an electric current in the cleaning tank is debatable on many kinds of work. The surest rule to follow is—where satisfactory results are obtained without power—don't use it, and of two cleaners, one requiring a current and the other working without it, the latter is preferable, for current costs money and is frequently a cause of defective work.

Having selected and proven your cleaner, study it, care for it, and don't change for something "just as good" for a cent or two difference in the price. Remember that a cleaner is either your best friend or your worst enemy, according to the way you work it, and there are always points worthy of your most earnest thought to obtain the best results. For while it is the desire of the manufacturer to advise the best methods and equipment, he is not infallible, and will welcome the chance to help you on any problem peculiar to your individual case.

Work under such conditions takes on a new meaning, stimulates effort, and brings as a sure reward, the satisfaction of having been a factor in removing a rock that may have blocked the road to advancement and knowledge.

Lithopone

Lithopone, a zinc product, is used in all flat wall finishes, wall paper and other interior decorations of the home. This material is also found in linoleum and table oilcloth, as well as being an important ingredient in surgical rubber goods and in certain hospital supplies.

The Operation of the Whitley Councils

Part 2 of an Article Giving in Condensed Form the History, Development and Present State of England's Experiment in Cooperation Between Employer and Employee*

The Provisional Joint Committee in March, 1919, presented a report, signed by Sir Thomas Munro, as independent chairman, Sir Allan Smith, representing the employers and Mr. Arthur Henderson, representing the Trade Unions. The establishment of a statutory 48-hour week, the discouragement of systematic overtime, and the regulation of necessary overtime were recommended in the first paragraph. With regard to wages, the committee recommended the establishment of minimum time rates to be universally applicable, on the basis recommendations of a commission which was to report within three months. For the less organized trades the extension of Trade Boards, with power to enforce minimum rates of wages agreed by representative Trade Unions and Employers' Associations in the respective trades was recommended. The committee further recommended the setting up through the medium of employers' and workmen's organizations of machinery for avoiding disputes, and the improvement of such machinery when it existed. Unemployment was to be checked by systematic effort, including organized short time in periods of depression; restriction of overtime, careful allocation of contracts by Government and local authorities to slack periods; immediate inauguration of a comprehensive housing program; State development of new industries such as afforestation, land reclamation, development of inland waterways, etc.; with alleviations such as extensions of the National unemployment, sickness, infirmity and old-age benefits, free education and training during periods of unemployment, and stricter limitation of child labor.

Finally the committee recommended, "The setting up of a permanent National Industrial Council to act in an advisory capacity to the Government and the public, and to consist of 400 members, half representing employers' and half representing workpeople's organizations; with a standing committee of 50 members on a similar representative basis."

The Industrial Conference met again on April 4th, 1919, and unanimously agreed to accept the recommendations of the Provisional Joint Committee and to submit them for the acceptance of the constituent organizations, "as soon as the Government officially declare their readiness to proceed at once with the legislative and other steps necessary to carry the report into effect." It was also decided that the Provisional Joint Committee remain in being till the National Industrial Council and Standing Committee have been brought into operation.

At a subsequent meeting of the Provisional Joint Committee a letter was received from Mr. Lloyd George, fully accepting in principle the recommendations as to the fixing by law of maximum hours and minimum rates of wages, and stating that a Bill was being drafted to give effect to the 48 hours week recommendation. The Prime Minister, however, pointed out that there were certain industries, such as agriculture, in which seasonal and other considerations necessitated special consideration, and some cases such as those of seamen and domestic servants in which it would be impossible to enforce a week of 48 hours. He agreed that where exceptions were necessary they should be applied for by those concerned through the machinery suggested in the report. As to wages, the Prime Minister accepted the suggestion that a Committee should be set up. As to unemployment, he hoped that this would be the first question to be dealt with by the National Industrial Council—the proposal to set up which he cordially endorsed.

Acts dealing with the questions of hours and minimum wages more or less on the lines of the report have been passed but the formation of a National Joint Industrial Council has not yet been accomplished.

The formation of Joint Industrial Councils, both National and District, for trades or groups of trades has in the meantime gone on steadily. Progress has not everywhere come up to expectations. There have been failures, as in the brass trade. In November, 1918, a national conference of employers' and workmen's organizations in the brass and kindred trades was held in Bliam and arrangements were made for the constitution of an Interim Joint Committee—the usual preliminary step to the formation of a Whitley Council. It has been found, however, difficult to frame a scheme which would provide a satisfactory representation of all the interests concerned and the promoters have come to the conclusion that the movement, to succeed, must begin from below, not from above, by the formation of Works Committees and of Councils to represent sections and localities, with a view to ultimate Federation of these in National Councils. Even in this direction the brass trade has made only a small advance. The Hearth Furniture Trade, located chiefly in the neighborhood of Birmingham, has its Joint Industrial Council. In other departments of industry also the movement has progressed more readily upon local and sectional lines. The Birmingham Jewelry Trade, for instance, has its joint council.

A successful example of a National Whitley Council is afforded by the Bedstead Trade. It represents some sixty firms 45 of which are in Birmingham and its members are appointed in equal numbers by the Bedstead Manufacturers' Federation and the Bedstead Workers' Union. This Council, however, started with the advantage of representing a trade in which co-operation between employers and employed had for many years been the rule. Various schemes for the increase of production have been from time to time adopted by mutual consent and the Whitley Council and simply carried on the work with some additional developments. A new scheme is at present being worked out by Bedstead Trade Council with a view to further encouragement of increased output. In the first instance, the Priestman scheme was taken into consideration. This scheme, which has been receiving much attention lately in Great Britain, was originated in 1917 by Priestman Brothers, Limited, Hull, Engineers. Its essential principle is a percentage increase in daily wages for every increase over standard output, the standard being fixed by mutual agreement between the workers and the firm. The principles and details of scheme received a general approval, but it was thought better to develop something along the lines which have hitherto been followed in the bedstead industry.

Compensation Insurance

Any employer who is in doubt as to his duties under the Workmen's Compensation Law should apply promptly to the Industrial Commission, at its office, 124 East 28th Street, New York City. "If an employer violates this law, he may expect very little consideration from the Commission and from the courts," said Mr. Shientag. In the last year the Court of Special Sessions imposed fines ranging from $50 to $250 on 122 employers failing to carry compensation insurance, and one uninsured employer in whose plant a worker was seriously injured was sent to jail for thirty days.

*For part 1 see THE METAL INDUSTRY, August, 1920.

EDITORIAL

Vol. 18 New York, September, 1920 No. 9

THE METAL INDUSTRY

With Which Are Incorporated
THE ALUMINUM WORLD, COPPER AND BRASS, THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS' REVIEW
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AMERICAN FOUNDRYMEN'S ASSOCIATION

Thirty-four years ago the American Foundrymen's Association was organized in Philadelphia, to aid and represent an industry, which up to that time had been fighting its way without organized help or co-operation. The association was intended to cover the entire field of casting metals. It was essentially an organization of practical men interested in the development of the industry from the point of view of the plant operator and manager. As it grew the iron foundrymen took a larger share in its administration, and those who were interested in non-ferrous metals found themselves sidetracked.

About fourteen years ago the American Brass Founders' Association was organized by men who felt that they had been neglected and would be submerged if they remained in the older body. A few years afterward they changed their name to the American Institute of Metals, and the success with which they met as an independent society was remarkable. This institute continued as such until a few years ago, when it joined the American Institute of Mining and Metallurgical Engineers, and took the name of the Institute of Metals Division. Whether or not the move was a good one was a question which caused some discussion at the time. However, the move was made and the Institute has evidently not suffered thereby. There was a growing tendency, nevertheless, for the papers which were presented to grow more and more "scientific" and to appeal less to the "practical" foundrymen and brass men. This trend was not unnoticed, but overcoming it was most difficult. Because of both the work and the men involved, much more is written from the laboratory than from the plant. The laboratory man is more used to handling a pen, and has the advantage of previous training in taking notes, and drawing up definite formulated conclusions from his work. This is not stated in criticism either of the practical foundrymen or of the Institute of Metals. It is simply a statement of fact, which the management of the Institute, although uniformly industrious and intelligent, could not overcome.

It is probably this condition, which has prompted the American Foundrymen's Association to enter actively into the non-ferrous field. They have placed on the Committee on Papers, Robert S. Archer, of the Research Department of The Aluminum Company of America, Cleveland, Ohio, and Lucien W. Mueller, of the Mueller Manufacturing Company, Decatur, Ill., in charge of the non-ferrous section, to stimulate investigation into the practical side of non-ferrous metallurgy and engineering. Unquestionably this will have a strong effect on the interest which men engaged in the brass, bronze and aluminum founding industry will take in the activities of the A. F. A., and although it may seem that this will duplicate the work of the Institute of Metals, it may very well be that they will supply something which the Institute has had difficulty in obtaining, and perhaps stimulate the interest to obtain more practical papers on its own account. Theoretically, it might, of course, be better and

easier to follow if all of the work on non-ferrous metals were done by one organization. Practically, however, it may be a decided benefit to both societies and foundrymen to broaden the field.

It is understood that several very practical papers on metals will be presented at the coming convention in Columbus, October 4-9. This presentation will be an additional stimulus to attend the regular fall meeting of the Institute of Metals Division; also it is always immensely worth while for metal men to set the annual exhibit of metals, machinery and supplies which is shown at these conventions.

FEDERATED AMERICAN ENGINEERING SOCIETIES

A few months ago a nation wide organization was launched with the object "to further the public welfare wherever technical knowledge and engineering experience are involved, and to consider and act upon matters of common concern to the engineering and allied technical professions."

Such a statement may, of course, at the first glance seem general and perhaps even hazy. The need for this society was probably sensed during the war, when engineering played such a large part and received such a large share of the publicity given war activities. In spite of the possible objection of lack of definite purpose, it seems to us that it will find much useful work, placing the technical man in his proper position in public affairs, which, as we understood it, is to be part of its work. There will undoubtedly be many occasions when engineering advice and co-operation will be needed by the Government, both local and national. Such advice and assistance can be rendered much more efficiently and with much greater effect by a central body, which coordinates all the great engineering societies than by any individual group. It is inevitable, now that the public realizes more and more fully, how much depends upon technical and engineering co-operation, and how many of the present difficulties can be overcome by intelligent application of engineering principles and methods, that the need for the Federated Societies will become greater. That the sailing will not be entirely clear, is easy to predict. At present there is no definite object in view. Much harm can be done by improper choice of activities and care must be taken to avoid the blatant type of publicity which the average newspaper is only too anxious to give. However, with strong responsible men in charge like those who are undertaking the work of organization at present, these dangers can be avoided. At present the four large engineering societies (Civil, Mechanical, Electrical, and Mining and Metallurgical) are co-operating through committees, headed by Richard L. Humphrey, A.S.C.E.; L. S. Marburg, A.S.M.E.; Charles F. Scott, A.I.E.E., and Joseph W. Richards, A.I.M.E. It will be interesting to see just what definite jobs the Federated Societies will find.

THE SMALL PLANT

The first impulse of the engineer after an examination of a small plant, without large automatic machinery, is to declare that it is out of date and backward. It is a simple matter to show where improved machinery, overhead runways, traveling belts, etc., can increase output. Very often the work is cramped, because of lack of floor space, and men elbow each other as they pass. As a matter of fact, nothing is more deceptive than such a plant. Many small manufacturers have found to their sorrow that the addition of more machinery immediately increased their overhead costs beyond the proportion, to which it must be kept in order to pay for itself. Cramped conditions disguise the fact that carrying and walking distances are shortened and that the time lost going from one machine to another is greatly decreased. Discomfort there may be, but in a plant of such size there is personal contact between the superintendent and the men, and the opportunity for him to create an atmosphere of friendliness, which plays a large part in removing the irritations and discomforts of the daily grind. Undoubtedly improved machinery does increase output, but it should be carefully remembered that this increase is not a free gift; it must be paid for by additional overhead cost, and often by additional labor to take care of this machinery. It is true that these costs probably would be overbalanced by the increased output, but this can be determined by no general rule or statement. The local conditions must cover the decision. It would be just as foolish to install an expensive crane for moving melted metal in small quantities for short distances, or to put in a large and expensive unloading device to take care of material which comes in only at rare intervals as it would be to install a trip-hammer to crack eggs. No general rules can be laid down, except that every additional expenditure must show the certainty of paying for itself in a reasonable period.

ALUMINUM DEVELOPMENTS

The most spectacular development in metals during the last decade, which incidentally has been a period of many astounding discoveries in alloys, has been that of alloyed aluminum. The metal which was once a scientific curiosity, then a freak, and which little by little with great difficulty forced its way into commercial use, has become one of the most valued and widely called for materials. The latest advance is in its use in aeroplanes. Obviously it has always had one outstanding advantage —its lightness. The objections which had previously been held against it, its weakness, brittleness and difficulty of working, have one by one been overcome by improved practice and by alloying. It has at last received official sanction in the form of favorable action by the National Advisory Committee for Aeronautics, on the resolution that their executive committee should communicate with manufacturing companies inviting their attention to the importance of Duralumin products, especially for aeroplane wings. This has been carried even further in practice. All metal aeroplanes have made records for non-stop flights. The Larsen monoplane has flown approximately a thousand miles carrying three passengers. This is a German machine, but the idea of all metal aeroplanes has spread rapidly in this country as well. Although the composition of the

metal used is not stated, it is most probably Duralumin; Fokker all-metal planes have Duralumin wing coverings instead of cloth. In the article by R. E. Search in this issue, the hardness of certain aluminum alloys is discussed, showing the far-reaching possibilities of Duralumin, which extends not only to machines which call for lightness, but to work where strength also is necessary, and in commercial fields the use of Duralumin is also being pushed for the frame work of motors and trucks. The importance of such developments cannot be overestimated.

ADVERTISING

Little as editors know of the business of their organization, and however staunchly they maintain that they are independent, it is impossible for the right hand of a publication to be absolutely ignorant of what the left hand is doing. We must admit that we read advertising pages with as much interest as the reading matter—even of our own journal. An article which appeared in the May issue of "Graphite" (published by the Joseph Dixon Crucible Company) appealed to us as sounding a very clear note. The question was asked of them "Why do you advertise when you are behind in deliveries," and their answer was as follows:

"Because we are building for the time to come, and we hope that this business will become many times greater than it is today. . . . We say without reservation that we hope, regardless of how progressive and efficient our manufacturing department may be, that it will never be able to catch up with our selling organization.

"If our efforts should be halted in the middle of the road in times of liberal buying, to wait for the manufacturing department, there might come a time when we would have to suspend operations, while waiting for the sales department. With such a policy we would be running around in a circle, disorganizing one day and reorganizing the next."

The quotation needs no further comment, as its good sense is self-evident. In this age of publicity, and in order to keep up, the progressive manufacturer has found that he cannot start and stop his selling activities any more than he can work his plant intermittently.

CORRESPONDENCE AND DISCUSSION

Although we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein.

THE METRIC SYSTEM

To the Editor of THE METAL INDUSTRY:

In the August issue of THE METAL INDUSTRY it was stated that the following resolution, adopted by the New York Branch of the Electro-Platers' Society, was presented to the President of the United States:

"Be it resolved by the New York Branch of the A. E. S. that we earnestly urge the units of the metric system be adopted by Congress of the United States and the British Parliament as the exclusive legal standards of weights and measurements."

This was voted unanimously at a meeting held in the city of New York, May 28, 1920, and signed by John E. Sterling, president. The resolution or report does not show any benefits the United States would gain by the adoption of this metric system, and as this is the first I have seen of any of the branches of the A. E. S. taking up this matter, I hope if any of the other branches give it any consideration, they will look into the matter thoroughly and give it consideration from all angles and points. I may state there is a mistaken feeling that manufacturers, engineers and department heads favor the metric system and urge its adoption in this country to the exclusion of our established system of weights and measurement. Such a feeling may exist among those who have not had practical manufacturing experience, but on the part of foremen, department heads and engineers, who are familiar with the needs of our factories, I am sure that there is a strong feeling and sentiment against a change.

The A. E. S. should make every effort to cooperate with any attempt to change our present system of measurements, but it should never be started by politicians. If any change or standardization is necessary the proper way to begin is to have the different engineering societies and manufacturing associations work the problems out in conjunction.

When so worked out the results will fit industrial conditions and will need no law to enforce their adoption.

A shining example of engineers and manufacturers working hand in hand to bring about standardization is that of the Society of Automotive Engineers. No legislation has been or ever will be needed to bring about the standards decided upon by the different committees of this society. Proposed standards are threshed out in conferences of practical production men and a tremendous amount of constructive standardization of automotive parts and accessories has been brought about. I can also refer you to the great work the National Association of Brass Manufacturers is accomplishing along this line, as their latest report shows that a committee journeyed to the international convention of the American Water Works Association, held at Montreal in June and presented the matter in a clear and forcible manner, of the great amount and variety of useless types of water works brass goods and service fixtures that were now in use, causing extra expense to manufacture, with no benefits derived from their use.

However, such standardization has its logical starting point with manufacturers and engineers, and not with legislators and politicians.

In the chemical laboratory the metric system is used. It is there because it has advantages in chemical work. It was adopted because of its advantages there. The metric system would be adopted by the industries if it possessed advantages for them. I could fill a whole page showing where the metric system in weights and measurements would be to a disadvantage if space would permit.

PETER W. BLAIR.

Montreal, Canada.
August 16, 1920.

ALUMINUM WELDING

To the Editor of THE METAL INDUSTRY:

Your suggestion on page 364 that your correspondent should puddle the weld would very likely land him into difficulties with metal as light as 17 to 20 B&S Gauge.

The best method of handling such work would be first to devise a rotating table on which the tea kettle or coffee pot could be clamped with the spout upright. The table would be knee operated to carry the work around one revolution so that the welder could feed the weld without reaching around.

The three other requirements are

(A) Feeding Sticks; (B) Flux; (C) Torch.

Pure aluminum should be the composition of the feeding rods and they should be about ⅛" diameter and entirely free from grease.

Fluxes are of many compositions but all of the same type. One used largely in England is:

Potassium Chloride	45%
Sodium Chloride	30%
Lithium Chloride	15%
Potassium Fluoride	7%
Potassium Bisulphate	3%

This can be moistened down with alcohol or used dry as a fine powder. In either case it must be tightly corked when not in use.

A special torch is put out for aluminum work by most of the makers and it will probably be found that oxy-hydrogen is hot enough for this particular job and will give less trouble than oxy-acetylene.

The feeding stick is heated and dipped in the flux taking up a fine layer of the compound. The flame is then applied to the work and carried along just as the metal begins to flow; being followed up with the feeding stick.

Of course, it is hardly necessary to mention that the job must be thoroughly cleaned before starting to weld and it may be given a thin coating of flux laid on with a camel hair brush but a good operator will usually dispense with this depending only upon the coating picked up on his welding rod.

New York, August 16, 1920 Ernest V. Pannell,
The British Aluminium Company, Ltd.

NEW BOOKS

METALS AND ALLOYS, published by The Metal Industry. Size 5¾ x 9, cloth binding, 32 pages. Price, payable in advance, $2.50. For sale by The Metal Industry.

This is a new edition of a compilation which was first presented in 1918. It is simply a tabulated list of non-ferrous metals and alloys, and their properties. Necessarily in a work of this kind a great deal of information is condensed into a very small space, and it is for this reason as much as for any other that the work is so valuable. The table on contents is as follows:

Percentage Composition of Non-ferrous Alloys.
Particulars of All the Known Metals.
Breaking Strength of Metals and Alloys.
Specific Resistances of Metals and Alloys.
Chemical and Physical Specifications of Bronze and Brass Castings, etc.
Melting and Boiling Points of Metals.
Electro-Chemical Equivalents of Metals.
Admiralty Alloys.

TIN, SHEET IRON, AND COPPER PLATE WORKER, by L. J. Blinn, published by Henry Carey Baird & Company, 2 West 45th Street, New York City. Size 5¼ x 7¾. Cloth binding. Price, payable in advance, $3.00. For sale by The Metal Industry.

This is a practical book for the worker in sheet metals. It covers the field thoroughly along that line, including many new and up-to-date problems. It covers a new field, as it furnishes pattern problems illustrated. There is a portion of the book treating on solder and metallic alloys, and another on lacquers and varnishes, which it covers thoroughly, although there is nothing new in the non-ferrous alloys. Valuable receipts round out the complete book, from which the worker in sheet metal will learn much.—P. W. B.

GOVERNMENT PUBLICATIONS

Scientific Paper No. 329.—The Reflecting Power of Monel Metal, Stellite and Zinc.

Data are given on the reflecting power of monel metal, stellite and zinc in the visible and in the infra-red spectrum. The reflectivity of monel metal is practically the same as that of nickel, except in the short wavelengths, where the reflecting power is somewhat lower than that of pure nickel.

A new determination of the reflectivity of stellite gave values about one per cent lower than previously observed in the visible spectrum; see Scientific Paper No. 342. The reflectivity of zinc is unique in having a deep minimum at 1μ, followed by an unusually high value beyond 2μ.

Mining and Preparing of Domestic Graphite for Crucible Use, by George D. Dub and Frederick G. Moses, with a chapter on the methods of analysis used by the Bureau of Mines. Bulletin 112. Bureau of Mines.

Gold and Silver in 1918. General Report. By J. P. Dunlop, U. S. Geological Survey.

TECHNICAL AND SCIENTIFIC PAPERS

INFLAMMABILITY OF ALUMINUM DUST

Summary of a Paper by Alan Leighton, Bureau of Mines, Technical Paper 152

Aluminum dust burns quietly when in a pile, but if this pile be disturbed in such a manner as to raise a cloud of the dust into the air the burning takes place with explosive violence. If a dust cloud already formed that has a density within the explosive limits be ignited, a violent explosion results. As several disastrous explosions of this dust have happened in manufacturing establishments, the Bureau of Mines has thought it worth while to investigate the physical and chemical properties of the dust with especial regard to inflammability and to the problem of extinguishing fires and of minimizing explosions once started.

Summary of Precautions to Be Observed.

Ventilation. Use a ventilating system that will not raise loose dust into suspension nor keep it in circulation.

Use a system of supplying dry air at a fairly even temperature. See that the volume of air supplied is enough to remove quickly any hydrogen from the room.

Machinery. Have machinery well grounded, well cared for, and properly oiled.

Use tools of soft metal as far as practicable.

Have machinery inclosed as far as possible.

Use vacuum dust-collecting devices over machinery likely to spread dust.

General Precautions. Use no naked lights.

Isolate dangerous processes in separate buildings.

Avoid wood construction as far as possible.

Fire Extinction. Avoid use of liquids in putting out fires, except, perhaps, oil, with subsequent use of carbon tetrachloride.

Use sand, or shale dust. Investigate sodium carbonate.

A NEW METHOD FOR CALIBRATING BRINELL HARDNESS TESTING MACHINES

An Abstract of a Paper Presented Before the American Society for Testing Materials at the Twenty-third Annual Meeting, to be held at Asbury Park, N. J., June 22-25, 1920, by J. L. JONES and C. H. MARSHALL.

For the purpose of calibrating Brinell machines directly, the authors have used weights acting through a lever of known multiplying ratio. The method is briefly described and illustrated. Calibration curves are given for two Brinell machines, one an Aktiebolaget Alpha machine and the other an Improved American Model machine.

IMPROVED ELASTIC LIMIT RECORDER

An Abstract of a Paper Presented Before the American Society for Testing Materials at the Twenty-third Annual Meeting, to be held at Asbury Park, N. J., June 22-25, 1920, by C. H. MARSHALL.

For the purpose of determining the elastic limit rapidly enough for commercial testing, we have used a recorder which can be attached to any standard testing machine without decreasing its accuracy in any way. This is accomplished by mounting on the poise of the testing machine, a card having graduations corresponding to the beam. This card moves in a horizontal direction in front of a punching device which is caused to move vertically at a speed proportional to the elongation as shown by an extensometer attached to the test specimen.

The record made is in the form of a series of punch marks which are the points for a stress-strain curve. These points are joined by a line drawn in by hand and the elastic limit determined on this curve.

If desired, two or more cards may be placed in the machine and records made simultaneously.

SOME ELECTRICAL PROPERTIES OF TITANIUM ALLOYS

Abstract of a paper presented at the Thirty-seventh General Meeting of the American Electrochemical Society, held in Boston, April 8-10, 1920.

By M. A. HUNTER and J. W. BACON.

Describes the production of pure titanium by reduction of titanium tetrachloride by sodium. Some of its physical and chemical properties are given. Tests were then made with this material, alloying it with Norway iron; magnetization and hysteresis tests were made on the products, showing higher magnetization curves and lower hysteresis losses. Silicon-iron thus treated gave exceedingly high permeability and low hysteresis loss. Alloys were also made with, nickel, copper, nickel-iron and nickel-copper. The alloys were made into wire and their electrical resistivities measured. Additions of Ti up to 5 per cent. increased the resistance moderately, but the wires oxidized badly when run at a red heat.

THE ELECTRIC-ARC MELTING FURNACE AND THE CENTRAL STATION ELECTRIC COMPANY

Abstract of a paper presented at the Thirty-seventh General Meeting of the American Electrochemical Society, held in Boston, April 8-10, 1920.

By AUGUSTUS C. SMITH.

A consideration of the effect the arc electric melting furnace has on the power supply, particularly of the surges on the line because of careless handling of the furnace during the melting-down period. Details are given of the abnormal requirements of a number of furnaces, and some, showing that they can be avoided by careful working. The author concludes that unless the furnace men are trained to handle the furnaces carefully during the melting-down period, the use in such furnaces on power companies' supply systems must be limited, because of the abnormal momentary peak currents.

THE ELECTRIC FURNACE AS APPLIED TO METALLURGY

Abstract of a paper presented at the Thirty-seventh General Meeting of the American Electrochemical Society, held in Boston, April 8-10, 1920.

A Reading List, 1900-1919. By CLARENCE J. WEST.

A list of magazine references on the construction and operation of the electric furnace as applied to the metallurgy of iron and steel and the non-ferrous metals. An attempt has been made to include all the important references since 1900, at which time the electric furnace was becoming established in the iron and steel industry. Since 1907 the reference to Chemical Abstracts is given in addition to the magazine references, since this source will enable the reader to eliminate many of the references here given as unsuitable for his particular needs.

Criticism of the arrangement of this work is cordially invited, since we desire to make such studies of the greatest value to all interested.

CHARPY IMPACT TEST AS APPLIED TO ALUMINUM ALLOYS

Abstract of a paper read at the Lake Superior Meeting of the American Institute of Mining and Metallurgical Engineers, August, 1920.

By E. H. DIX, Jr., M. E., M. M. E., Cleveland, O.

1. The Charpy impact resistance of copper aluminum alloys decreases with increase in copper content, within the limit of these experiments (12 per cent. copper).

2. No direct relation has been discovered between the Charpy impact resistance and the more common physical properties. However, in general, for this series of alloys the impact resistance decreases as the yield point tensile strength, and hardness increase and the impact value follows more nearly the elongation than the "product of tensile strength by elongation," as is often stated.

3. The notch effect is very much less pronounced in this series of alloys than in steel. The ratio of unnotched to the notched resistance in the Charpy test varies from 2.4 to 4.8, the notched bar having one-half the breaking area of the unnotched. For steel bars having equal breaking areas, the writer has found the unnotched bar to offer four to five times as much resistance as the notched bar. The notched specimen was the same as used in these experiments, but the unnotched was of the shape that would be obtained by planing a notched bar to the root of the notch.

4. The slow-bending tests give the same order of results as the Charpy impact, but the ratio of energy absorbed in the slow-bending test to that of the Charpy test varies from 0.27 to 1.02. Captain Philpot of England has reported that for steel this ratio is so nearly constant that he was led to the following conclusion: "The notched bar test made in a pendulum testing machine is not essentially an impact test." The experiments reported on in this paper do not justify such a conclusion for these copper-aluminum alloys.

5. The ratio of maximum load of the unnotched bar to maximum load of the notched bar in the slow-bending test is very interesting. Since the strength of a beam varies as the square of its depth, the maximum load of the unnotched bar should be four times that of the notched bar if the notched bar were not further weakened by the "notch effect." This ratio varies from 2.73 for pure aluminum to 4.44 for the 12 per cent. alloy. This shows that the notch not only does not weaken pure aluminum, but rather enables it to stand a proportionally higher load. For the 12 per cent. copper alloy, the weakening effect is small.

6. These results indicate that the Charpy impact test is a satisfactory test for aluminum alloys. When making this statement, the author fully realizes the danger of judging a material by its Charpy impact value without full consideration of the other physical properties. For instance, we must learn the proper Charpy figure combined with a given tensile strength and elongation that will give the most satisfactory shock-resisting aluminum alloy, just as the steel crankshaft manufacturer now knows the proper combination of Charpy impact value and yield-point strength that will give the most satisfactory service.

ZINC ALLOYS WITH ALUMINUM AND COPPER

Summary of Paper by W. Rosenhain, D. Sc., F. R. S., John L. Haughton, M. Sc., and Kathleen Bingham, B. Sc., presented at the Annual General Meeting of the Institute of Metals, held in London, on Friday, March 12, 1920.

The constitution and mechanical properties of alloys of zinc containing copper up to 10 per cent. and aluminum up to 15 per cent., are described in this paper. The constitution may be briefly summarized by saying that there is a ternary eutectic containing 4 per cent. of copper and 7 per cent. of aluminum, and two binary complexes, one the depressed eutectic of the aluminum zinc alloys, and the other formed from one constituent of the aluminum zinc and one of the copper zinc series. The ternary eutectic does not extend much beyond the alloys investigated.

The rolling properties of the alloys have been studied, and it has been found that the addition of 1 per cent. of copper improves both the hot and cold rolling properties of zinc to a very marked extent. With the addition of more copper or aluminum, the cold rolling properties fall off rapidly. All the alloys are capable of hot rolling, but those containing much copper and aluminum become very brittle on cooling.

The mechanical properties of the alloys are somewhat complex. The rolled material has, in many cases, a very high elongation if tested soon after being rolled, but in the course of a few months this falls to quite a low value; in one case from 70 per cent. on 2 inches shortly after rolling to 1 per cent. after one year. Annealing at a temperature as low as 100° C. has a similar effect, although heat treatment has no influence on cast specimens. The rate of loading in the tensile test has also a very marked effect; with rapid loading the maximum stress is very high and the elongation very low, whereas under very slow loading this is reversed. These observations can be explained on the assumption of the existence in the alloy of a considerable amount of amorphous material, produced by rolling. Other experiments confirming this hypothesis are described.

For castings of such a nature that the small shrinkage which occurs on ageing in most of the cast alloys, would not be deleterious, an alloy containing 3 per cent. of copper and 6 per cent. to 15 per cent. of aluminum is recommended. For rolled material, zinc containing 1 per cent. of copper appears to be very promising.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ASSOCIATE EDITORS { JESSE L. JONES, Metallurgical; WILLIAM J. REARDON, Foundry; PETER W. BLAIR, Mechanical; LOUIS J. KROM, Rolling Mill; CHARLES H. PROCTOR, Plating-Chemical; CORYDEN P. KARR, Exchange-Research

ARSENIC BRASS

Q.—Please give me the formula for an arsenic brass solution.

A.—Arsenic is added to a brass solution to produce a clearer and brighter deposit. For this reason you possibly ask for an arsenic brass solution. Any good formula may be used in preparing the solution. The following is a good example:

Water	1 gallon
Sodium Cyanide	6 ozs.
Copper Cyanide	4 "
Zinc Cyanide	1½ "
Bicarbonte of Soda	2 "
Sal Ammoniac	½ "
Sodium Arsenite	1 to 2 grains

The sodium ascenite is prepared by dissolving equal parts of caustic soda and white arsenic in a small amount of hot water. For example, white arsenic contains 437½ grains. Dissolve I oz. caustic soda in 8 ozs. water, add lozs. white arsenic and stir until the arsenic is all dissolved. This mixture would be ample for 500 gallons of solution, but oftentimes only half as much is required to bring up a bright color to the brass deposit when it is dull and earthy in appearance. In replenishing brass solutions a small amount of free cyanide should be added frequently and then additions of equal parts of sodium and copper cyanide dissolved in hot water and added to the solution. When metal is required add very little zinc. An excess is the cause of half the brass platers' troubles.

Dissolve the zinc cyanide in an equal amount of sodium cyanide and add sparingly to the brass solution. If a little sal ammoniac is added, say ¼ oz. per gallon of solution, it will be found that with good brass anodes comparatively little zinc need to be added to the brass solution.—C. H. P. Problem 2,855.

BLACK ON ALUMINUM

Q.—How can I get black color on aluminum?

A.—Aluminum can be blackened by using the following formula:

Water	½ gallon
Muriatic Acid	½ "
Powdered White Arsenic	10 ozs.
Sulphate of Iron Crystals	10 "

To prepare the solution dissolve the arsenic in 1 quart of the acid by the aid of heat.

The sulphate of iron in 1 quart of hot water. Mix the remaining water and acid, then add all together.

The aluminum to be blackened.

Should be free from grease, etc. Immerse for a moment or two until black, then wash thoroughly in cold water. Dry in sawdust and afterwards lacquer as usual.—C. H. P. Problem 2,856.

BLACK ON BRASS

Q.—We have been having considerable trouble on a black dip for polished brass chandelier parts. Our dip works on small articles, such as small soldered brass arms, but we cannot seem to get a favorable black on larger work, such as a 14-inch brass spinning with a soldered band on it.

We have been using a dip consisting of two gallons muriatic acid to every four ounces of white arsenic, and four ounces sulphate of iron, but this dip on large work is not practical for it eats the solder away from the joints, and leaves the work very cloudy and streaky.

Please advise us on a good practical dip and how we should prepare to clean the work for the dip to get good results.

A.—Use the following dip for black on polished brass chandelier parts:

Liquid Ammonia—three gallons. Saturate with carbonate of copper to excess. That is add the carbonate of copper as long as it dissolves and then add more so that there is a marked excess. Then add water—one gallon.

Clean articles in potash, rinse, cyanide dip, rinse and immerse in dip, having the dip stirred up well. When black remove, rinse and dry. When the dip is not in use keep well covered. When it becomes weak add more carbonate of copper and ammonia.—J. H. Problem 2,857.

BROWN ON BRASS

Q.—How can I get a brown shade on rolled brass?

A.—Sample color was produced by dipping in a polysulphide solution, 2 ounces and sodium hydroxide 3 ounces to the gallon, used hot, using sulphuric acid 16 fluid ounces to the gallon of water to set the color. Use oxidize pickle alternately until color is obtained. Then dry and tumble in barrel to relieve high lights. Dip lacquer.

Browns of various shades on brass may be produced by the following solutions:

Sodium sulphide	2 ozs.
Hyposulphite of Soda	2 "
Butter of Antimony	2 "
Water	3 gallons

Boil and use hot.

Sodium carbonate	1 lb.
Carbonate of Ammonia	1 "
Verdigris	1 "
Water	1 gallon

Sodium carbonate	2 lbs.
Verdigris	¼ "
Copper Sulphate	½ "
Sal Ammoniac	¼ "
Water	1 gallon

Use hot.

Butter of Antimony	2 ozs.
Sodium hydroxide	8 "
Water	1 gallon

—J. H. Problem 2,858.

COPPER ON STEEL

Q.—Recently I had 200 fairly large steel articles to copper plate; after plating about 100 of them I noticed that the anodes were covered with a green coating. During the time of plating the second batch I frequently had to clean off this green coating to allow the anodes free to work. Can you tell me what caused this and how to remedy same? The solution is composed of sulphate of copper and cyanide.

A.—The trouble you are experiencing is due to the lack of free cyanide which is a solvent for the copper compounds formed upon the anodes. Add sodium cyanide at frequent intervals until you reach the point where your anodes will remain almost entirely clean while plating is going on. Such a point is reached when anodes have a dark appearance, but no heavy scum, while plating; but upon shutting off the current, within five minutes the anodes should present a bright red appearance. In case you find that upon the addition of cyanide to keep anodes clean, you receive no deposit on your work, it signifies that your metal content is too low. Dissolve copper cyanide (carbonate will do if you have no copper cyanide, but do not use copper sulphate) in sodium cyanide and add to your bath, until you have the solution so balanced the anodes will present appearance above mentioned and metal be deposited on your work. The higher your metal content the higher the permissible free cyanide to keep anodes clean.—J. H. Problem 2,859.

MANGANESE BRONZE

Q.—What is the best way to make manganese bronze?

A.—The cheapest commercial method of making manganese bronze and one which gives fairly uniform and fairly satisfactory

material, is that described by McKinney at the New York meeting of the American Institute of Mining Engineers, February, 1919. Yellow brass turnings, galvanizer's dross, a hardener of equal parts of copper and manganese, aluminum turnings and scrap zinc, are the materials used. They are used in the proportions that will give the following average composition:

Copper	57.00
Zinc	39.50
Iron	1.00
Lead	.50
Tin	.50
Aluminum	.50
Manganese	1.00

Instead of yellow brass turnings, sheet yellow brass scrap, Muntz metal, etc., may be used.

Common salt and charcoal, each to the amount of 1½ per cent of the weight of the total metal charge, are also added. When using miscellaneous materials, some heats will be obtained that are rather high in tensile strength, but low in elongation and vice versa. By mixing these extremes together, manganese bronze will be obtained that will easily meet the average buyer's specifications.—J. L. J. Problem 2,860.

PLATING PHONOGRAPH PARTS

Q.—Please tell me how I can plate phonograph parts with nickel and gold.

A.—Die castings can be nickel plated by proceeding as follows:

1st. Polish in the usual manner.

2nd. Cleanse the excess of polishing dirt from the particles by washing in benzine or gasoline. Dry out in fine maple sawdust.

3rd. Cleanse in a mild cleaning solution composed as follows:

Water	1 gal.
Tri-sodium phosphate	4 ozs.
Soda ash—58%	4 ozs.
Sodium Cyanide—96.98%	¼ oz.

Temperature of solution 180° Fahr. Immerse in the hot cleaner for only a moment or two, rinse thoroughly in cold water and nickel plate direct for ten to twenty minutes at 2 to 3 volts. If preferred a prepared cleaner such as those advertised in the columns of THE METAL INDUSTRY can be used.

Nickel solution:

Water	1 gal.
Double Nickel Salts	8 ozs.
Common Salt	4 ozs.
Citric Acid	¼ oz.

The acid may slowly be increased to half an ounce as soon as the solution is in operation. This solution will plate rapidly and white without peeling or streaks, if strict attention is given to proper cleaning, which is all important.

Phonograph parts are usually finished in a brush or satin gold finish. Phonograph needle cups would have to be finished to match. It is necessary to produce the desired surface before gold plating, either brush or satin finish.

To accomplish this prepare a brass solution composed as follows:

Water	1 gal.
Sodium Cyanide	4½ ozs.
Copper Cyanide	3 ozs.
Zinc Cyanide	1 oz.
Bicarbonate of Soda	1 oz.
Sal Ammoniac	⅓ oz.

The temperature of the solution should be maintained at 80° Fahr. at 3 volts. After preliminary nickel plating the die castings for a few minutes, wash them thoroughly and then brass plate them, just long enough so they can be scratch-brushed lightly with the usual crimped brass wire scratch brush. After brass plating the parts are ready for gold plating.

The gold solution can be made as follows:

Water	1 gal.
Sodium Cyanide	¼ oz.
Gold Trisalyt	⅓ oz.
Phosphate Soda	½ oz.

Temperature 160° Fahr. at 2 volts. Gold plate for about 10 to 12 seconds. If the current is properly regulated a uniform yellow gold finish will result, which it will not be necessary to rescratch-brush.

The parts when finished should be lacquered. It should be remembered that it is difficult to gold plate direct upon nickel. Brass closely resembles gold when deposited correctly, so requires less gold than nickel or copper to give a satisfactory finish.—C. H. P. Problem 2,861.

MODELING WAX

Q.—What is the formula for modeling wax?

A.—There are several types of modeling wax, as follows:

No. 1.

Yellow wax	1,000 parts
Venice turpentine	130 parts
Lard	63 parts
Armenian bole	725 parts

Melt together, and while still liquid pour into tepid water and knead, like bread, until a plastic mass is obtained.

No. 2. Summer Wax

White wax	20 parts
Ordinary turpentine	4 parts
Oil of sesame	1 part
Vermilion	2 parts

No. 3. Winter Wax

White wax	20 parts
Ordinary turpentine	6 parts
Oil of sesame	2 parts
Vermilion	2 parts

Formulæ Nos. 2 and 3 should be prepared in the same manner as Formula No. 1.—C. H. P. Problem 2,862.

RING EFFECT

Q.—How can we produce the ring effect like that applied to the inside of cigarette cases and watch movements?

A.—The "Ring Effect" noted on the inside of cigarette cases, watch cases, and so forth, and which is also sometimes termed Damaskeen finish, is produced in various ways. A small machine arranged similar to a vertical drill is usually used, and is run at from 500 to 800 revolutions per minute. To produce a perfect ring a fibre or rubber tube may be used with either pumice stone and water or flour emery and oil as the abrasive. For solid ring formation hard wood, carbon sticks or emery sticks may be used. The above mentioned abrasives may be used with the hard wood.

The articles to be "ringed" are held by the hands and brought in contact with the rapidly revolving rubber tube, hard wood or emery stick, applying a little abrasive frequently. The result will be a ring or solid curl as desired.—C. H. P. Problem 2,863.

SILVER ON GAUGE DIALS

Q.—Please send me a formula for silver plating etched steam gauge dials.

A.—A solution for silver plating etched steam gauge dials should be prepared as follows:

Water	1 gallon
Sodium Cyanide	2½ to 3 ozs.
Silver Cyanide	2 ozs.
Ammonium Chloride	¼ "

Voltage 1 to 1½. Temperature normal.

It will be necessary either to nickel plate them lightly first and then strike in a silver strike solution composed as follows:

Water	1 gallon
Sodium Cyanide	6 ozs.
Silver Cyanide	½ "
Caustic Potash	⅛ "

If nickeling is to be avoided then what is termed a blue or mercury dip will have to be used to give a thin film of mercury upon the surface of the brass before silver plating, otherwise the silver may not properly adhere.

The following are the proportions for the mercury dip.

Water	1 gallon
Sodium Cyanide	6 ozs.
Bichloride Mercury	½ "

Immerse the dials only for a second or two then wash in water and silverplate.—C. H. P. Problem 2,864.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

Due partly to the large number of patents granted during the last year and partly to space limitations, we have been forced to fall behind in our records. In order to catch up, we feel that it will be best to conserve the limited space available by omitting the sketches which have hitherto appeared on these pages, and condensing the descriptions. The only other alternative would be to omit many patents which might be of vital interest, and this we do not wish to do. As soon as we have caught up, we shall resume the publication of sketches.—Ed.

1334,051. March 16, 1920. **Method of Forming Composite Metal Plugs.** Orton L. Prime, Milwaukee, Wis.

That method of forming a composite plug having a body member and a cup shaped shell receiving and interlocked with one end portion of the body member, which consists in providing a body member and a cup shaped shell casting or forging member having its wall flared outwardly and having its base of lesser dimension than the base of the body member, and in then forcing said body member and shell into a cup shaped die member to press the shell member into interlocking engagement with the body member and simultaneously close the pores of said shell member.

1,334,089. March 16, 1920. **Metal Alloy.** James B. Grenagle, Catonsville, Md., assignor to The Rare Metals Reduction Company, a corporation of Maryland.

A metal alloy containing substantially 6.8% of zirconium, 53.5% of columbium and 39.7% of tantalum.

1,334,092. March 16, 1920. **Method of Preparing Metal to be Galvanized or Coated.** Henry G. Harmeling, Paducah, Ky., assignor of one-half to John L. Fay, St. Louis, Mo.

The herein described method of preparing metal to be galvanized or coated which consists in subjecting the metal, when heated to a temperature of approximately two hundred twelve degrees, to an acetic acid solution, that is heated to a temperature of approximately two hundred twelve degrees.

1,334,179. March 16, 1920. **Method of Making Metallic Sodium.** Albert W. Smith and William R. Veazey, Cleveland, Ohio, assignors to Dow Chemical Company, Midland, Mich., a corporation of Michigan.

The method of making metallic sodium, which consists in electrolizing sodium carbonate in a fused mixture of such salt and sodium chlorid, the ingredients being so proportioned that such mixture has a lower melting point than either of its constituents.

1,334,183. March 16, 1920. **Process of Galvanizing Metals.** Robert C. Steffen, Middletown, Ohio.

The process of galvanizing metal, which comprises passing it through a preparing agent and a galvanizing agent above a part of the surface of the latter and heated by independent means.

1,334,193. March 16, 1920. **Magnesium Alloy.** William R. Veazey, Cleveland, Ohio, assignor to The Dow Chemical Company, Midland, Mich., a corporation of Michigan.

As a new product, an alloy of manganese and copper with magnesium, the manganese and copper aggregating a relatively small per cent of the total.

1,334,335. March 16, 1920. **Apparatus for Treating Metal Objects.** Henry E. Warren and William M. Wheildon, Ashland, Mass., assignors to The Lombard Governor Company, Ashland, Mass., a corporation.

In combination, a work-holding spindle having an axial and rotary movement, a tool carrier mounted to move in the arc of a circle to cause a tool carried thereby to act on a portion of the work, and means for removing said spindle axially to move the work with relation to said tool to cause the latter to act on another portion of the work substantially at the end of the circular movement of the tool carrier.

1,334,459. March 16, 1920. **Smelting Furnace.** Arthur Jones, Los Angeles, Cal., assignor to U. S. Smelting Furnace Company, Belleville, Ill., a corporation of Illinois.

In a smeting furnace, the combination with a cylindrical body provided with refractory lining, of a pair of conical ends removably secured to said body and also provided with refractory lining, said ends each carrying at its inner part a supporting track and being provided at its outer part with a central opening.

1,334,571. March 16, 1920. **Electric Metal Working Apparatus.** Eihu Thomson, Swampscott, Mass., assignor to Thomson Electric Welding Company, Lynn, Mass., a corporation of Massachusetts.

In an electric metal working apparatus, the combination with the heavy current leads connected to the work and separated by a free space, of a counter inductive circuit or shield surrounding said space and separated from the leads as and for the purpose described.

1,334,584. March 16, 1920. **Process of Separating Metal Plates.** Charles E. Bailey, Youngstown, Ohio.

In a device of the class described, a frame portion provided with shoulders at each end of the lower portion, bed rolls located within said frame, and depressing arms pivotally swung so as to engage said shoulders, the above mentioned rolls thereby drawing the pack of sheets through a fixed path thereby giving the pack double and opposite bends.

1,335,079. March 30th, 1920. **Electric Furnace.** Charles William Speirs, Battersea, London, England. Assignor to Morgan Crucible Company, Ltd., London, England.

An electric furnace comprising a container in the form of an approximately circular saucer-shaped heart having three integral lateral extensions, and terminals attached to said extensions for supplying three-phase electric current thereto.

1,335,174. March 30th, 1920. **Electrolytic Apparatus and Method.** Matthew M. Merritt, South Middleton, Mass., assignor to Copper Products Company, Boston, Mass., a corporation of Maine.

The method of depositing metal by electrolysis which comprises providing a stationary cathode and periodically varying the level of the electrolyte to provide alternate immersion and emersion of the cathode without substantial change in the position thereof.

1,335,175. March 30th, 1920. **Electrolytic Apparatus and Method.** Matthew M. Merritt, South Middleton, Mass., assignor to Copper Products Company, Boston, Mass., a corporation of Maine.

Electrolytic apparatus including a cathode support having provision for alternate immersion and emersion of the cathode in the electrolyte and a "thief" adjacent the cathode.

1,335,176. March 30th, 1920. **Electrolytic Apparatus and Method.** Matthew M. Merritt, South Middleton, Mass., assignor to Copper Products Company, Boston, Mass., a corporation of Maine.

The method of electrolytically depositing metal on segregated surfaces of objects which comprises mounting the objects on a rotatable shaft and rotating the shaft during electro-deposition while a portion only of the surfaces to be deposited upon are immersed in the electrolyte, whereby each surface is alternately immersed and emersed.

1,335,177. March 30th, 1920. **Electrolytic Method and Apparatus.** Matthew M. Merritt, South Middleton, Mass., assignor to Copper Products Company, Boston, Mass., a corporation of Maine.

The electrolytic method which comprises providing a mandrel, mold or matrix as a cathode, initiating electrolytic deposit of metal thereon in an alkaline electrolyte and continuing electrolytic deposit thereon in an acid electrolyte.

1,355,199. March 30th, 1920. **Electric Furnace.** Marcus Ruthenburg, Buffalo, N. Y.

In an electric furnace the combination with a shell of heat-transmitting material; of a resistance element surrounding said shell and substantially coextensive with the outer surface thereof, said element comprising a plurality of members individually removable from the furnace for replacement.

1,335,209. March 30th, 1920. **Corrosion of Tubes and Machinery Parts of Copper or Copper Containing Alloy, Process for the Prevention of Selective,** Franz von Wurstemberger, Zurich, Switzerland, assignor to Aktiengesellschaft der Maschinenfabriken Escher Wyss & Cie., Zurich, Switzerland.

The process for the prevention of selective corrosion of tubes and machinery parts of copper or copper containing alloys, which are in contact with water containing ions, consisting of the electrolytic production in the corrosive water with which the machinery parts are in contact, of an easily soluble hydrolytically decomposable acid reacting salt as anodic product, the cathodic product being carried away.

1,335,210. March 30th, 1920. **Corrosion of Tubes and Machinery Parts of Copper or Copper Containing Alloys, Method and Device for the Prevention of Selective,** Franz von Wurstemberger, Zurich, Switzerland, assignor to Aktiengesellschaft der Maschinenfabriken Escher Wyss & Cie., Zurich, Switzerland.

The art of preventing selective corrosion of water-contacting machinery parts of copper or copper containing alloys, comprising forming by electrolysis in a vessel separate from but connected to the water supply of such machinery a salt having, upon hydrolysis, an acid reaction.

1,335,279. March 30th, 1920. **Enameling and Annealing Furnace.** Paul Du Pont, Paris, France.

In a furnace, the combination of a bath, a source of combustible material, means between the bath and the source of combustible material to effect a distribution of the unignited combustible material around the bath and means between the first-named means and the bath to ignite the distributed material.

1,335,284. March 30th, 1920. **Metallic Alloy.** Frank S. Hodson, Philadelphia, Pa.

An improved alloy containing zinc, aluminum, copper, manganese and titanium, in which the zinc amounts to about 80 to 85 per cent of the whole, while the remainder consists mostly of aluminum and copper in the ratio of about 9 to 1; the alloy also containing small percentages of manganese and titanium in the ratio of about 2 to 1, the manganese varying between 2 per cent and .001 per cent of the whole alloy and the titanium varying between 1 per cent and .0005 of the whole alloy.

1,335,453. March 30th, 1920. **Metallic Articles, Process and Apparatus for Treating.** Lars G. Nilson, Hoboken, N. J.

The method which consists in forming an article, hardening it, subjecting it to a periodic magnetic field while drawing, and finishing to size.

1,335,509. March 30th, 1920. **Molds for Finished Castings, Method of Making.** John Kralund, Brooklyn, N. Y., assignor to Doehler Die Casting Company, Brooklyn, N. Y., a corporation of New York.

A method of making a mold for finished castings, by constructing a suitable metal die or dies, pouring molten metal therein to produce a match plate, match plates or portion thereof, the said metal being hard and heat resistant when it has solidified, and making a mold from one or more of such match plates, of plastic composition, having mold cavities therein formed by such match plate or match plates.

1,335,755. April 6th, 1920. **Process for Permanently Producing Picture or Like Effects Upon Enameled Metal Surfaces.** Robert Sandby, Chicago, Ill.

The herein described process of producing picture or like effects upon an enameled surface consisting in first cleaning the enameled surface, then laying thereon a uniform coat of a suitable gum varnish and allowing the same to partially set, then transferring the picture thereto, by first printing the matter to be transferred on transfer paper with printer's ink, dusting the same evenly with a metallic oxide mixed with silica and pressing the same evenly upon the varnished surface, allowing the same to set and carefully removing the paper, and after allowing the surface to dry dusting the same with a flux that fuses at a comparative low temperature and firing the same, substantially as described.

1,335,982. April 6th, 1920. **Alloy of Zirconium and Lead, Process for Producing an,** Napoleon Petinot, New York, N. Y., assignor to United States Ferro-Alloys Corporation, New York, N. Y., a corporation of New York.

The process of producing an alloy of zirconium and lead comprising the melting of lead in a furnace so that it forms a molten bath, the melting together a mixture of zirconium oxide and burnt lime in such proportions that a calcium zirconate ($CaZrO_3$) is formed, then adding to the mixture sufficient carbon to reduce zirconium oxide to zirconium and to form calcium carbide, the charging the mixture into the lead bath whereby the metallic zirconium is absorbed by the lead bath.

1,336,052. April 6th, 1920. **Electroplating, Apparatus for,** George C. Pinger, New York, N. Y., assignor of one-half to Republic Iron and Steel Company, a corporation of New Jersey.

A device adapted to electro-plate pipe sections and similar hollow articles, consisting of a pair of tracks immersed in an electro-plating solution, wheeled carriers comprising links of an endless chain and movably mounted upon said tracks, means upon said wheeled carriers for supporting and moving pipe sections through an electro-plating solution, said tracks being connected with the cathode terminal of an electric circuit, and anodes within said solution and adjacent the path of a pipe section in its movement through the plating solution.

1,336,081. April 6th, 1920. **Solder for Aluminum.** James G. Kelly, Sedalia, Mo., assignor of one-half to Holmes Hall, Sadalia, Mo.

A solder of the character described, comprising thirty-four (34%) per cent. lead; thirty-four (34%) per cent. block tin; thirty (30%) per cent. zinc, and two (2%) per cent. aluminum, amalgamated in the manner hereinbefore described.

1,336,108. April 6th, 1920. **Metal-Working Feed Mechanism.** Alfred Trosch, Rochester, N. Y., assignor to Arthur H. **Ingle, Rochester, N. Y.**

Metal working feed mechanism, comprising a feed shaft extending transversely of the machine, equipped with a pawl and ratchet device for imparting step by step movement thereto, a gear engaging said pawl and ratchet device having a pitman connected therewith to oscillate the same, a pivoted lever having a longitudinal slot therein in which an end of said pitman is mounted for adjustment toward and from the lever pivot, an adjusting screw mounted in said lever adjusting said pitman end and arranged at the side of the machine for convenient actuation, and constantly driven gear connections having a second pitman connected therewith and also engaged with said lever for imparting a swinging movement thereto.

1,336,137. April 6th, 1920. **Non-Crucible Furnace.** Joseph E. Hausfeld, Cincinnati, Ohio.

A non-crucible furnace comprising a body, means for tiltably mounting the body, a fuel inlet in the body, means for supporting liquid or gaseous fuel thereto, said body having a top adapted to receive a charge of metals, said top having an upwardly extending rim around it to form a shallow receptacle and an orifice in said top, for the purpose described.

1,336,212. April 6th, 1920. **Molding Core.** Louis C. Evon, Detroit, Mich., assignor to Searight-Downs Manufacturing Co., Detroit, Mich., a corporation of Michigan.

A molding core, having in combination a plurality of collapsible parts including a spreading member, and means for starting the release of the member, comprising a bridge or yoke adapted to bear on the other collapsible parts, and a screw and nut operating in connection with said bridge to start the spreading member.

1,336,224. April 6th, 1920. **Manufacture of Metal Reflectors, Mirrors, and Other Metal Articles Having a Reflecting Sur-**

face or Surfaces. Thomas Hancock, Bow, England, assignor to The Reflecto-Metal Company, Limited, London, England.

A new article of manufacture being a solidified self-supporting film of metal of low melting point, the whole of which is of the physical character of metal solidified directly from its molten state without mechanical treatment of any kind, the said solidified self-supporting film having one of its faces a mirror.

1,336,234. April 6th, 1920. **Ingot-Casting Device.** Frank L. Jamison, Pittsburgh, Pa.

An ingot-casting device comprising a mold formed of a body portion and a head, said head being a different contour than the contour of said body and smaller than the latter, burners surrounding the lower portion of the head, a hood inclosing the head and overlapping the burners and provided with air-inlets, said hood of a different contour from that of the head, thereby forming a heating chamber surrounding the head, and said hood having its top provided with vent openings.

1,336,239. April 6th, 1920. **Metal While Being Milled, Apparatus for Forming a Smooth Surface on,** Thomas B. Kinraide, Boston, Mass.

In combination with a milling machine having a rotary cutter, a rotary bristle brush whose axis extends parallel with the axis of the cutter, a yoke in which said brush is journalled, a supporting shaft parallel with the axis of said brush, means for adjustably securing said yoke to said shaft to maintain the brush parallel with the axis of the cutter, the yoke being adjustable to change the position of the brush toward and away from the cutter, and means for maintaining the yoke in its adjusted position, so that the brush may be maintained either in engagement with the cutter or entirely free from the cutter, as desired.

1,336,259. April 6th, 1920. **Chill-Mold.** William H. Nichols, Pittsburgh, Pa.

A chill-mold comprising the inner chill, a water-jacket surrounding said chill and removably secured thereto, said water-jacket forming one continuous uninterrupted passage completely encircling said chill having an inlet and outlet for the admission and discharge of the cooling fluid.

1,336,260. April 6th, 1920. **Chill Mold.** William H. Nichols, Pittsburgh, Pa.

A chill-mold having a water-jacket cast integral therewith forming a continuous passage completely encircling the chill for substantially the entire height of said chill.

1,336,266. April 6th, 1920. **Metal-Heating Furnace.** Homer D. Williams, Pittsburgh, and William Ahlen, Duquesne, Pa.

In a metal heating furnace, the combination with the furnace heating chamber, of a plurality of large burners, a plurality of small burners at one end of said heating chamber, means for supplying gas to said burners and means for supplying preheated air under pressure to said burners, said means including an air heating chamber having an air inlet at one end open to the atmosphere, a fan having an inlet connected to the outlet on said air heating chamber, a recuperator having an air inlet connected to the fan outlet, a heating chamber having an inlet connected to the air outlet on said recuperator, and a conduit connecting the outlet on said heating chamber to said large burner, a branch conduit connecting said small burner with said first named burner, and suitable control valves in said conduits.

1,336,420. April 13th, 1920. **Aluminum, Process for Hardening.** Hachig M. Buluckian, Cleveland, Ohio.

A process for hardening aluminum consisting in adding gum-glutin, oyster shell and gum arabic to molten pure aluminum.

1,336,459. April 13th, 1920. **Ingot-Mold and Method of Molding.** Robert C. Woodward, Williamsport, Pa.

The method of molding ingots comprising the continuous and progressive application of water to the exterior surface of the mold commencing at the bottom thereof and continuing toward its upper end, thereby accelerating and controlling the cooling of an inclosed ingot.

1,336,767. April 13th, 1920. **Metal-Casting Apparatus.** William H. Warren, Youngstown, Ohio, assignor by direct and mesne assignments to the Realty Trust Company, and Rollin C Steese trustees, both of Youngstown, Ohio.

Metal-casting apparatus, comprising a casting ladle, a trough member arranged to receive the discharge from said ladle, and having a plurality of discharge nozzles, and other trough members supported in position to receive the metal discharge from the nozzles of the first named trough member, each of the second named trough members having a plurality of discharge nozzles, and means whereby the said trough members may be moved to vary the discharge at the different nozzles, substantially as described.

1,336,768. April 13th, 1920. **Metal Casting.** William Hobart Warren, Youngstown, Ohio, assignor, by direct and mesne assignments, to the Realty Trust Company, and Rollin C. Steese, trustees, Youngstown, Ohio.

The method of casting metal which consists in subdividing a stream of molten metal at a temperature considerably higher than the proper casting temperature and exposure the sub-divided stream to the atmosphere sufficiently to cool it to the proper casting temperature, then filling a plurality of molds simultaneously with the thus sub-divided and cooled stream of molten metal and controlling the relative rates of flow of the subdivided streams, substantially as described.

1,336,820. April 13th, 1920. **Electric Furnace.** Edwin L. Crosby, Highland Park, Mich.

In an electric furnace, in combination with a refractory shell member provided with a vapor-tight door, a pair of electrodes adjustably engaging through the ends of said shell coaxially therewith, means for projecting and retracting said electrodes while permitting the maintenance of their coaxial position with respect to the shell member in all positions thereof, a pair of travel rings spacedly and variantly engaging about said shell member with respect to the axis thereof and means for imparting rotative movement thereto, thereby effecting the rotation of the shell about an axis whose position relatively to the horizon is constantly varying during the period of rotation.

1,337,156. April 13th, 1920. **Electric Furnace.** Julius A. Pickens, Easley, S. C.

The combination, in an electric furnace, of combustion chamber equipped with an electrode having an aperture and chambered opening, longitudinally through its central portion and mating its point with the point of an electrode of solid construction, means of insulating said electrodes from electric contact with the surfaces of said combustion chamber and means of conveying an electric current into said electrodes, substantially as described.

1,337,305. April 20th, 1920. **Metals, Process of Melting and Reducing.** Morris H. Bennett, Waterbury, Conn., assignor to Scovill Manufacturing Company, Waterbury, Conn., a corporation of Connecticut.

The process of melting in an electric furnace having a closed furnace chamber, non-ferrous metals having high thermal conductivity, consisting in so delivering an electric current of high amperage to the charge through a plurality of electrodes as to set up a magnetic field in the fusing metal whereby circulation of said metal is obtained, so controlling and regulating the current delivery that the total energy transmitted is substantially evenly distributed between the electrodes and that the heat developed at the ends of the electrodes during fusing will be carried away by the charge before the metal at or near the electrode ends is sufficiently raised in temperature to cause an undue production of fumes, continuing the delivery of energy until the charge is raised to pouring temperature, and condensing the fumes and returning the metallic constituents to the charge.

1,337,333. April 20th, 1920. **Foundry-Mixer.** Herbert S. Simpson, Evanston, Ill.

A mixer comprising a material container, means permitting discharge of mixed materials, a spider in said container, means for rotating the same, an axle supported by said spider, a bracket adjustably mounted at one end of the axle, a muller journaled on said bracket, a second bracket adjustably mounted on the other end of the axle, a yoke member integral with said second bracket, and a plow blade mounted on each of the arms of the yoke member.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

ELECTRICALLY WELDED STEEL STRUCTURE

A Description of a New Development Which Will Prove Useful in Foundry Construction, by ROBERT V. FICKES, The Electric Welding Company of America.

The interesting thing about Electric Arc Welding is not so much the method which is employed, but rather the constantly widening application of it as an industrial process.

Since the discovery of Electric Arc Welding, considerable progress has been made in developing various kinds of equipment, to make its use more easy and general. But the real science lies in the human skill behind the equipment.

One of the noteworthy achievements of the engineering staff of The Electric Welding Company of America, has been the recent demonstration of the practical application of Electric Arc Welding to steel construction work.

The Electric Welding Company of America needed a new building as an addition to its plant in Brooklyn, and needed the building in a hurry. The engineers decided that such a building could be constructed by welding instead of riveting, and that there were specific advantages which would result from such a method of construction.

In the first place, the construction work could be done during the twenty-four hours of the day without disturbing the people in either commercial or private life, because the process is absolutely silent, the nerve-racking noise of riveting being entirely eliminated. Second, the necessity for fabricating steel is entirely eliminated, and likewise the necessity of waiting several weeks until such parts should be fabricated and made ready for erection.

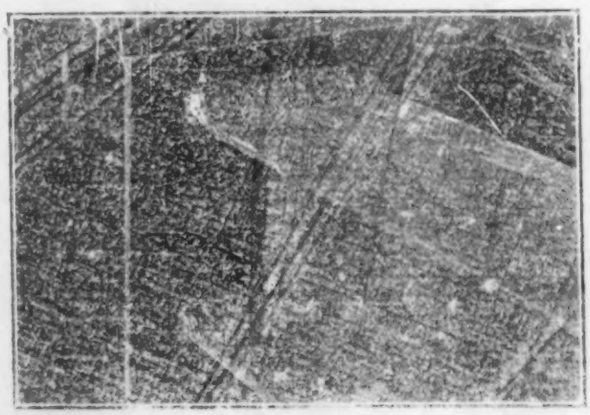


FIG. 1. H-BEAM WELDED TO BASE.

Third, by electric welding joints of 100 per cent. strength were made possible, as against the ordinary 60 or 70 per cent. strength possessed by a rivcted joint. Fourth, there was possible a reduction in the actual weight of metal required in the various members. Fifth, actual tests had conclusively demonstrated that such construction work could be done at lower cost than by riveting.

Before they could proceed with their building plans, it was necessary to obtain permission from the various city building departments, and such permission would only be given if certain tests were made which would satisfy the building officials, that a welded structure would be absolutely safe and would compare favorably in all other respects with a riveted steel framework. Certain samples of welded joints were requested for tests as to strain, compressing and shearing.

A specific sample of a lap weld of 1¼" x ⅜" bars, the ends lapped 1¾" and welded across the edges, was submitted. This welded sample was put in the machine in direct tension and developed the full strength of the bar as the break occurred in the bar 3" above the weld and developed a strength close to 60,000 pounds per square inch without effecting the weld. These welds were cut across, but showed no line of markation between the welding metal and original bar metal.

Another sample consisted of two angles set at right angles and lap welded at the intersection, the 3" legs vertical (2" x 3" x ⅜"). This sample was set in the machine so that there was a horizontal lever arm of 8" from the center of pressure to the center of weld and intersection, and developed a beam load of 11,375

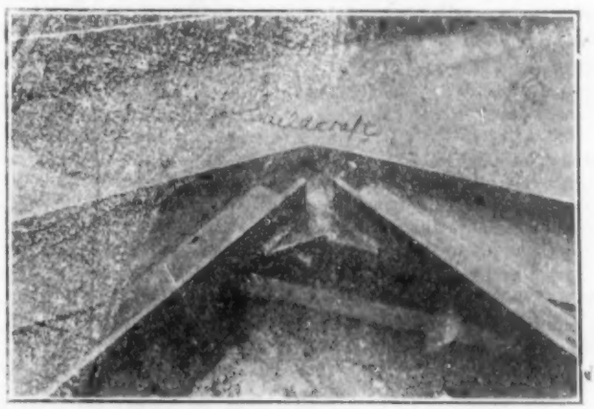


FIG. 2. PEAK OF WELDED TRUSS.

pounds at the weld or a torsional stress of 91,000 pounds at the weld with no apparent distress to the weld. The angles buckled to such an extent that they failed to resist pressure.

The tests of these samples were entirely satisfactory to the building officials. Permission was subsequently given to proceed with the erection of the steel framework, but there was still another test to be made of the steel trusses of forty feet span, which were to be used to sustain the roof. These trusses were of fan type of design and all members were electrically welded together, no bolts or rivets being used. The trusses were spaced twenty feet apart, supported by 8x8 H columns 19' high; on the sides of these columns, brackets were fastened to carry an overhead traveling crane of five-ton capacity. The weight of each truss was about 1,400 lbs., the top and bottom chords were com-

FIG. 3. TEST ON TRUSSES FOR BUILDING DEPARTMENT, NEW YORK CITY.

posed of 4x5x⅜ tee irons, and the struts were 3x2x⅜" angles, the purlins were 10"—15 lbs. channels.

The trusses were designed for a live load of 40 lbs. per square foot, each truss supporting a panel of 800 square feet. They were tested at a load of 120 lbs. to the square foot, or a total load of

48 tons on the two trusses. The load consisted of gravel in bags which were piled in tiers on planking arranged for the purpose.

Readings were taken at different increments of the loadings for the deflection in the truss of members.

The trusses were left under load 48 hours and readings showed east support settled 15/16", west support ¾" actual, point No. 2—7/16", actual—point No. 4—½" actual deflection. Point No. 3—9/16" actual deflection. Two days afterward the load was entirely removed and readings taken at this time showed all points in the trusses had returned to their original position, leaving no permanent deflection except at point No. 3 of 1/16".

To quote from the official report: "From the above it is evident that electric welding is a dependable method of uniting structure members and is stiffer than riveting if the work is properly performed."

Generally speaking, electric welding can be used in all parts of steel structures—but the following specific list shows its direct application in the construction of:

Columns—plate and angle.
Columns—channel and plate.
Columns—latticed.
Trusses

and for joining
Bearing plate to upper and lower ends of columns.
Trusses to bearing plate and columns.
Cross bracing between columns.
Purlins to roof trusses.
I beam rail for trolley supports to columns.

These are just a few of a list of instances where electric welding eliminates the use of bolts, rivets and gusset plates and in some cases connection angles and brackets.

A SENSITIVE DRILLING MACHINE

A drilling machine especially designed and adapted for the jewelry, novelties and fine metal work in general has been placed on the market by William Dixon, Inc., 39 John street, New York City. It is adjustable for two speeds, operated with a hand and foot feed, mounted on a floor column with motor, chuck and zinc-lined box. It is made for 110 to 220 volts, D. C., or 110 or 220 volts A. C., 60 cycles, single phase. The specifications are as follows: Chuck capacity, 0 to 21-64"; table to chuck, 4"; vertical movement of spindle, 2"; improved swinging table, 6" diameter; height of column, 34"; shipping weight, 215 lbs.; motor, ¼ h.p.; dimensions of zinc lined box, 20x29".

DRILLING MACHINE FOR FINE METAL WORK.

ROTARY PLATING TANK

ROTARY PLATING TANK MANUFACTURED BY THE ST. LOUIS PLATERS' SUPPLY COMPANY, ST. LOUIS, MO., DESCRIBED IN THE METAL INDUSTRY, JULY, 1920, P. 330.

CARBORUNDUM REFRACTORIES

The Carborundum Company, of Niagara Falls, N. Y., has acquired from the Alien Property Custodian the plant formerly owned and operated by the Didier-March Company at Perth Amboy, New Jersey. The plant will be taken over at once and converted to the manufacture of a complete line of Carborundum Refractories, which are now giving service in a wide range of high temperature furnace work. The principal business of the Didier-March Company was the manufacture of special refractory clay products and practically all of its equipment is well adapted for the processes of the manufacture of Carborundum Refractories.

Carborundum Refractories are made in four regular grades in addition to which special mixes are utilized in the production of Carborundum saggers. The four regular grades of Carborundum Refractories are known as Carbofrax "A," "B" and "C," and Refrax. All of the standard shapes in which fire clay or silica brick are made can be produced in any of the grades, in addition to which practically any special shape, including tile, muffles and saggers, can be made in any of the three Carbofrax grades only.

Refractories made in any of the three Carbofrax grades are composed over 90% of pure Carborundum, to which small percentages of exceedingly high refractory materials are added to facilitate binding. The high refractibility of Carborundum is, therefore, maintained in Carborundum Refractories. Further, in furnace construction required to transmit heat, such as muffle walls, etc., they are valuable, due to their exceedingly high thermal conductivity, which the manufacturers claim to be at least seven times that of the average fireclay brick.

The Refrax brick has the same general characteristics as the Carbofrax, but in the production of this brick absolutely

no binding material is used. Refrax brick, therefore, contains 100% Carborundum. These brick are produced in an electric furnace which is run at a temperature sufficient to produce Carborundum, which is approximately 4,000°F. Refrax Brick is used for the more extreme temperature conditions.

Principal uses for Carborundum Refractories as developed up to date have been in the construction of boiler furnaces, water gas generators, carbonizing retorts, heat treating and forging furnaces, all types of oil burning furnaces, pottery kilns, tunnel kilns, rotary kilns, electric furnace construction, muffle furnaces, saggers, etc.

In addition to the regular line of made-up refractories, the new plant at Perth Amboy will produce a complete line of refractory cements. At the present time ten special grades of cement are produced and sold by the Carborundum Company. It has not been found possible to produce a refractory cement which will cover all conditions, and consequently ten special cements have been developed and these have been found to cover the field of requirements completely. Carborundum cements are always recommended for laying up Carbofrax or Refrax brick.

Complete information regarding all Carborundum Refractories and helpful data on their proper uses will be gladly given by The Carborundum Refractory Service Department, The Carborundum Company, Niagara Falls, N. Y.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN FOUNDRYMEN'S ASSOCIATION

The American Foundrymen's Association has designated September 20-25 as a special "Foundrymen's Week" during which time a concerted effort will be made to reach all non-member foundrymen with a personal invitation to join.

The Committee on Promotion and Membership is enlisting the co-operation of members in all parts of the country and team captains are being appointed for each city or group of towns.

Applications for membership received before or during "Foundrymen's Week" will be acted upon by the A. F. A. Board of Directors in time to qualify the applicants with full membership privileges for the big annual convention and exhibit that will be held in Columbus, Ohio, the week of October 4th.

REPORT OF NOMINATING COMMITTEE

To the Members of the American Foundrymen's Association.
Gentlemen:—

We the undersigned, Nominating Committee of your Association, duly appointed by the Board of Directors at a meeting of the Board on January 13, 1920, report that at a meeting of the committee in Cleveland, Saturday, July 24, 1920, the following named persons were unanimously nominated for officers and directors of the American Foundrymen's Association:

FOR PRESIDENT:

W. R. Bean, Eastern Malleable Iron Co., Naugatuck, Conn.

FOR VICE-PRESIDENT:

C. R. Messinger, Sivyer Steel Casting Co., Milwaukee, Wis.

FOR DIRECTORS FOR ONE YEAR:

G. H. Clamer, Ajax Metal Co., Philadelphia, Pa.
Fred Erb, Packard Motor Car Co., Detroit, Mich.
B. D. Fuller, Defiance Paper Co., Niagara Falls, N. Y.
C. E. Hoyt, Chicago, Ill.
Lucien W. Mueller, H. Mueller Mfg. Co., Decatur, Ill.

FOR DIRECTORS FOR TWO YEARS:

J. P. Pero, St. Louis, Mo.
H. R. Atwater, Osborn Mfg. Co., Cleveland, O.
S. B. Chadsey, Massey-Harris Co., Ltd., Brantford, Ont., Can.
A. E. Howell, Phillips & Buttorff Mfg. Co., Nashville, Tenn.
S. T. Johnston, S. Obermayer Co., Chicago, Ill.

FOR DIRECTORS FOR THREE YEARS:

C. S. Koch, Fort Pitt Steel Casting Co., McKeesport, Pa.
W. A. Janssen, American Steel Foundries, Chicago, Ill.
R. A. Bull, Duquesne Steel Foundry Co., Coraopolis, Pa.
A. O. Backert, Penton Publishing Co., Cleveland, O.
V. E. Minich, American Foundry Equipment Co., New York.
G. P. Aborn, A. O. Backert, A. I. Findley, Benjamin D. Fuller, S. Griswold Flagg, 3d; George L. Grimes.

Respectfully submitted,
J. P. Pero, Chairman.

NEW YORK BRANCH, A. E. S.

President Sterling presided at the August meetings of New York Branch of the A. E. S. Mr. Emil Hass was elected active member of New York Branch. The secretary-treasurer reported that the New York Branch has at present $694.29.

The proposed referendum vote to admit assistant foreman platers as associate members of the A. E. S. was lengthily discussed pro and con. Past President T. B. Haddow exhibited his magic powder, an additional agent for nickel solutions. Five members were requested to make additions of the magic powder to a nickel solution and report the effects obtained on the deposit at the next meeting. The following plating problems were discussed:

The effects of Arsenious on cast iron when used in a brass solution.

The effects of hypo-sulphite of sodium on oxidized copper when used in a copper solution.

The durability of nickel deposits obtained in a double chloride nickel solution.

BRITISH INSTITUTE OF METALS

The Autumn Meeting was held in Barrow-in-Furness, September 15 and 16.

The following is a list of the papers delivered:

(1) W. E. Alkins, M.Sc. (Manchester), on "The Immiscibility of Metals from the Point of View of the Phase Rule."

(2) Engineer Lieutenant-Commander G. B. Allen, R.N. (London), on "Service Experience with Condensers."

(3) T. G. Bamford, M.Sc. (Birmingham), and W. E. Ballard (Birmingham), on "The Influence of Gases on High-Grade Brass."

(4) Kathleen E. Bingham, B.Sc. (Teddington), on "The Allotropy of Zinc."

(5) Professor H. C. H. Carpenter, M.A., Ph.D., A.R.S.M., F.R.S. (London), and Constance F. Elam (New Barnet), on "Crystal Growth and Recrystallization in Metals."

(6) J. H. S. Dickenson (Sheffield), "Note on a Failure of Manganese Bronze."

(7) D. Hanson, M.Sc. (Teddington), and Marie L. V. Gayler, B.Sc. (Teddington), on "The Constitution of the Alloys of Aluminium and Magnesium."

(8) O. F. Hudson, D.Sc. (London), and J. H. Darley (London), on "The Constitution and Structure of Certain Tin-Antimony-Copper Alloys."

(9) F. Johnson, M.Sc. (Birmingham), on "Some Features in the Behavior of Beta Brass When Cold-Rolled."

(10) R. T. Rolfe, F.I.C. (Bedford), on "The Effect of Increasing Proportions of Antimony and of Arsenic, Respectively, Upon the Properties of Admiralty Gun-Metal."

(11) H. B. Weeks, F.I.C., "Notes on Brass Foundry Practice at Messrs. Vickers, Limited, Barrow-in-Furness."

ELECTRIC FURNACE ASSOCIATION

The subject of refractories has been selected for the session of the Electric Furnace Association which will be held in Columbus on Wednesday afternoon, October 6th.

The meeting will provide an opportunity for a discussion of their problems by the users and makers of refractories. Papers

will be presented by steel men and by the manufacturers of bricks and lining materials, and considerable time will be allowed for questions and informal discussion.

Some other interesting features are being arranged for the meeting so that it should be a considerable addition to the program of activities already planned for the first week of October in Columbus.

The Electric Furnace Association plans to hold its session in one of the buildings of the Ohio State University.

AMERICAN WELDING SOCIETY

At a meeting of members of the welding trade in Chicago, held in the rooms of the Western Society of Engineers on Tuesday evening, August 3, a Chicago Section of the American Welding Society was organized. There were about seventy-five in attendance, representing many railroads terminating in Chicago and also many of the larger local industries. The following officers and directors were elected:

Chairman—M. B. Osburn, assistant superintendent Pullman Car Works.

Vice-chairman—O. T. Nelson, president General Boiler Co.

Secretary-treasurer—L. B. Mackenzie, president The Welding Engineer.

DIRECTORS

3 years.

E. Wanamaker, electrical engineer, Rock Island Ry.

H. B. Bently, superintendent motive power and machinery, C. & N. W. Ry.

Andrew Oliver, welding supervisor, Standard Oil Co.

W. M. B. Brady, commercial engineer, General Electric Co.

2 years.

Harold Cook, managing editor, Acetylene Journal.

W. A. Slack, president, Torchweld Equipment Co.

K. R. Hare, district manager, Transportation Engineering Co.

J. M. Jardine, partner, Western Welding & Equipment Co.

1 year.

W. H. Bleecker, Jr., district manager, Page Steel & Wire Co.

Oliver Mitchell, partner, A. F. Mitchell & Son.

Walter L. Seibert, president, Welded Products Co.

Don B. McCloud, secretary-treasurer, Gas Products Assn.

Meetings will be held on the second Tuesday of each month in the rooms of the Western Society of Engineers, and those interested in the subject of autogenous welding, by all methods, are invited to attend. The address of the secretary-treasurer is 608 S. Dearborn St., Chicago.

SEPTEMBER MEETING

The regular meeting for September was held in the rooms of the Western Society of Engineers, room 1735 Monadnock Building, Dearborn Street and Jackson Boulevard, at 7:30 P. M., Tuesday, September 14. The speakers for the evening were S. W. Miller, Rochester Welding Works, and E. Wanamaker, Electrical Engineer, Rock Island Lines.

RELATIONS COMMITTEE

A committee, consisting of E. Wanamaker and H. B. Bentley, has been appointed to confer with the parent society relative to the work to be covered by the Chicago Section.

PITTSBURGH SECTION

The following is the ticket elected by the Pittsburgh Section:

OFFICERS

(To serve for one (1) year)

Chairman, J. D. Conway, Secetary-Treasurer, Railway Sup. Mfg. Assn.

First Vice Chairman, Dr. R. H. Brownlee, Consulting Chemist.

Second Vice Chairman, H. H. Maxfield, G. S. Mt. Power, Pennsylvania R. R. (Cent. Div.).

Secretary (temporary), F. W. Tupper, American Welding Society.

Treasurer, F. O. Gardner, Treasurer Pittsburgh Testing Laboratories.

EXECUTIVE COMMITTEE

(To serve for three (3) years)

W. M. Finlayson, Asst. to M. M., Carnegie Steel Co. (Homestead Wks).

George H. Danforth, Constr. Engr., Jones & Laughlin Steel Co.

J. A. Warfel, Dist. Mgr., Air Reduction Sales Co.

E. C. Sattley, Gen. Mgr. Sales, Page Steel & Wire Co.

(To serve for two (2) years)

A. M. Candy, Gen. Sales Engr., Westinghouse Elec. & Mfg. Co.

H. D. Kelley, Dist. Mgr., Metal & Thermit Corp.

D. J. Redding, Asst. Supt. M. P., Pittsburgh & Lake Erie R. R.

C. H. Newbury, Supt. Wld. and Cutg., Crucible Steel Co. of America.

(To serve for one (1) year)

Charles Crates, Superintendent, Blaw-Knox Co.

Frank S. Austin, Dist. Sales Mgr., Carbo-Hydrogen Co.

J. H. Rush, Weld. Sales Eng., Rush Machinery Co.

B. P. McDaniel, President, Power Piping Co.

WASTE MATERIAL DEALERS

Circular F, giving the standard classification for old metals, effective July 1, 1920, to July 1, 1921, has been issued. Dealers or consumers wishing to have these circulars mailed to them as they are issued should forward their request to the secretary, Charles M. Haskins, Times Building, New York, N. Y.

Harry F. Mansman, formerly in charge of the Charleston Traffic Bureau, has taken charge of the Traffic Department of the association.

FEDERATED ENGINEERING SOCIETIES

The annual convention of the American Society of Civil Engineers held in Portland, Ore., August 10, 1920, adopted resolutions which provided,—

> "that the board of direction of the American Society of Civil Engineers be directed to submit at once the question of the American Society of Civil Engineers becoming a charter member of The Federated American Engineering Societies to referendum vote to the corporate membership of the American Society of Civil Engineers as recommended by the joint conference committee, said ballot to be accompanied by a copy of the constitution and by-laws of said federation," and
>
> "that the board of direction of the American Society of Civil Engineers be further instructed in event of a favorable vote on said referendum to proceed at once to take such steps as may be necessary for the American Society of Civil Engineers to become affiliated with said federation."

At the meeting of the board of directors of the American Institute of Electrical Engineers held in New York on August 12, 1920, the following resolution to become charter members of the Federated American Engineering Societies was unanimously adopted:

> "RESOLVED, That the American Institute of Electrical Engineers accepts the invitation to it to become a charter member of the Federated American Engineering Societies and pledges its hearty cooperation in the work thereof."

The Cleveland Engineering Society at its meeting on August 10 voted to become a charter member of the Federated American Engineering Societies.

NATIONAL CHEMICAL EXPOSITION

When the Sixth National Exposition of Chemical Industries opens its doors in Grand Central Palace, New York City, Monday, Sept. 20, it will be the biggest display of its kind that has ever been seen. The total number of exhibitors to date exceeds 450, as against a high record for previous shows of 358, made in Chicago last year.

To house this large display four floors of the Palace are necessary, and the Chemical Show is the only exposition, outside of the annual automobile show, that requires such enormous floor space. There will be a remarkably wide range to the exhibits this year, and it has been decided to divide the exposition into sections. The Fuel Economy Division and the Material Handling Division, both new this year, have attracted many prominent concerns.

Five symposiums are on the week's program, and at all of these men of prominence in the chemical world will speak. The symposiums are divided into the following classifications: Fuel Economy, Materials Handling, Industrial Management, Chemical Engineering and Ceramic. Motion pictures will be a feature every evening, and these should prove of great interest to the public.

PERSONALS

ITEMS OF INDIVIDUAL INTEREST

L. W. Hewitt has been appointed general manager of the Specialty Brass Company, of Kenosha, Wis.

Howard Horner, formerly metallurgist of the American Metallurgical Corporation of Philadelphia, is now with the Frick Company, at Waynesboro, Pa.

John H. Ramage, formerly metallurgist, Industrial Department, United States Navy Yard, Norfolk, Va., is now metallurgist for the Westinghouse Lamp Co., at Bloomfield, N. J.

Stanley P. Rockwell has resigned his position as vice-president of Weekes-Hoffman Co., of Syracuse, N. Y., to become metallurgist of the Whitney Manufacturing Co., of Hartford, Conn.

Richard R. Rees, formerly chief metallurgical chemist at the U. S. Arsenal, Watervliet, N. Y., has recently accepted a position as metallurgist with the Neptune Meter Co., Long Island City, N. Y.

T. C. Eichstaedt has accepted a position with United States Ordnance Depot, at South Amboy, N. J., where he is installing a large electro-galvanizing plant, which he will supervise. They have 8,000,000 boosters and adapters which they are to refinish.

W. J. Bell, formerly foreman of the plating department of the Victor Talking Machine Company, Camden, N. J., has accepted a position with the Biddle-Tanner Company, Philadelphia, makers of antique lighting fixtures, as general foreman of the plating, polishing and lacquering departments.

Julius Janes, formerly president of the Standard Steel Castings Company, of Cleveland, has recently concluded an arrangement with the Farrell-Cheek Steel Foundry Company, of Sandusky, Ohio, by which he will be the sales representative of this organization in Cleveland and Cuyahoga County.

Frank E. Rentz, formerly superintendent of A. Allan & Son, founders of Allan Red Metal, has now taken the position as superintendent of the Sheeler-Hemsher Company, of Philadelphia, Pa., founders of the fifty-copper and fifty-lead alloy, also the Rentz bronze bearing and bushing metal for heavy duty.

Donald S. Michelsen, formerly general manager of the Worcester Pressed Steel Company, Worcester, Mass., has assumed the office of general manager of the Globe Machine & Stamping Company, Cleveland. A. F. Shroeder, formerly president and general manager, will continue to hold the office of president which he has held for so many years.

Dr. E. F. Northrup has resigned his professorship at Princeton University in order to devote his entire time to his work with the Ajax Electrothermic Corporation of Trenton, New Jersey, manufacturers of the Ajax-Northrup High-Frequency Induction Furnaces. Dr. Northrup has recently been elected vice-president of this company and is now engaged in perfecting for them a brass-melting furnace of this Ajax-Northrup type.

Edward O. Goss, for many years general manager of the Scovill Manufacturing Company, was elected president of that company at a recent meeting of the board of directors, following the resignation and retirement of President Mark L. Sperry.

EDWARD O. GOSS, WHO SUCCEEDS MARK L. SPERRY AS PRESIDENT OF THE SCOVILL MANUFACTURING CO., WATERBURY, CONN.

The new president is the son of Chauncey P. Goss, for many years president of the Scovill company, and has long been one of the leading advisers in the affairs of the factory. In addition to his new duties as president, he will retain the general managership.

Mr. Sperry's resignation is due to his retirement from active business affairs. He has been with the Scovill company for 58 years, having risen from a clerk in the bookkeeping department to the presidency of the concern. He was born in this city in 1842. In 1869 he was elected secretary and in 1877 was chosen a director. Since the death of Chauncey P. Goss, over two years ago, he has been president.

DEATHS

JOSEPH RICHARD SMITH

Joseph Richard Smith, president of the Waterbury Button Company, Waterbury Castings Company, and the West Side Savings Bank, secretary of the Smith & Griggs Company, and a director in the Waterbury National Bank, United States Fastener Company of Boston, Oakville Company, and the Waterbury Buckle Company, died at his home in Middlebury, on August 2. He was born in Waterbury, Conn., January 20, 1850, educated in the public schools, and at the age of 16 entered the brass mill of the Holmes & Griggs Manufacturing Company in New York for the purpose of acquiring a thorough practical knowledge of the brass manufacturing industry, remaining there for six years. He returned to Waterbury in 1873 to take charge of the affairs of the Waterbury Button Company, of which his father was the largest stockholder, and had acted as its president and treasurer for a number of years. He was at one time treasurer of the Connecticut Electric Company, and the Waterbury Horse Railroad Company. He belonged to numerous social organizations and was a 32d degree Mason.

JOSEPH RICHARD SMITH

ALFRED G. HINDERER

Alfred G. Hinderer, 57 years of age, manager at Louisville for Follansbee Brothers Co., Cincinnati, tin and lead manufacturers, handling tinners' and metal workers' supplies, is dead at Louisville, as a result of a tumor of the brain. Mr. Hinderer had lived in Louisville for twenty-five years, and was a member of the Pendennis Club, one of the finest clubs in the South.

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

WATERBURY, CONN.

STRIKE SITUATION.

SEPTEMBER 7, 1920.

With the last of the recent Waterbury strike activities now a matter of history, local industry is once more taking up the interrupted course of post-war reconstruction, and matters of production and progress.

Meetings of labor organizations are no longer prohibited by the police, and plans for an intensive reorganization campaign were adopted at a recent closed meeting of the local machinists' union. The meeting was addressed by Joseph Tone, organizer for the International Association of Machinists, and one of the most active leaders in the past strike.

Plans to bring about an amalgamation of the New England Workers' Association, an independent labor organization, and the American Federation of Labor have struck a snag, as there is bitter feeling on the part of the former, who claim that the brilliant promises of financial aid made by the American Federation of Labor during the recent strike had "bamboozled" them.

It has been officially announced that the Metal Trades Department, Washington, D. C., has been petitioned for a charter for the Waterbury Metal Trades Council. Preliminary steps have been taken for a huge organization to include all the metal trades workers in the city. Threats to do this were heard frequently during the past strike, but no action ever materialized. At least 10,000 members will comprise the new organization.

According to the present plans, both skilled and unskilled workmen will be allowed membership, and each branch is to retain its local autonomy. Some of the branches to be absorbed by the council are the machinists, brass workers, iron moulders, buffers and polishers, blacksmiths, drop-forge workers, sheet metal workers and boiler makers. In addition, plans are being considered for the formation of a Brassworkers' International, the object being to unionize the entire brass industry of the Naugatuck valley.

COAL SUPPLIES.

Local manufacturers in close touch with coal production and transportation believe that Naugatuck valley industry will be little benefited by the recent ruling of the Interstate Commerce Commission establishing pools of coal in New York and Newport News to insure the winter's supply of coal for New England.

Authorities interviewed recently assert that manufacturers throughout New England have been holding off buying coal on the expectation that because of the forming of these pools coal would be much cheaper later in the season. This holding off cannot be delayed much longer because of the fact that New England, during the winter, is able to import only about fifty per cent of the coal needed, making it necessary to stock up ahead to take care of this deficit. It is also believed that the forming of the pools will cause a tremendous demand for coal all at once by buyers throughout this section, which will have the result of both higher prices and a greater freight congestion than at present.

Although these statements emanate from various Waterbury manufacturers, they are made to apply only generally, as the local factories do not appear to be worrying a great deal about their winter's coal supply, except for the natural precaution of watching the underground trend of the situation with an eye to any future need for definite action.

TORRINGTON

SEPTEMBER 7, 1920.

The Union Hardware Company has secured an option on an unoccupied factory building in Canaan and will establish a branch there. The building is the so-called knitting mill, owned by Rufus H. Whitford. It will be used by the hardware company for the manufacture of ball-bearing rolls.

Scarcity of labor in Torrington, coupled with the fact that the housing situation here is acutely serious, making it difficult for newcomers to secure homes, led the Union Hardware Company to decide to establish a branch plant.

About 50 operatives, mostly girls, will be employed at the branch plant at the outset, it is said. The force at the Torrington plant will not be reduced, an official of the company informed a METAL INDUSTRY reporter.

The work of remodeling the Canaan building is already well under way.

A permit has been granted by the borough board for an addition to the main office building of the **Hendy Machine Company.** The adition is to consist of another story, making the building three stories in height, and is to cost $10,000.

Alva Belden, of Bakerville, has given up his situation at the **Hendy Machine plant** after 17 years of service. During that period he has driven daily from Bakerville to Torrington, returning at night, a total of ten miles, and has lost only six weeks in ten years. The company presented him with a gold watch in recognition of his faithfulness.

Sixty-five employes of the **Turner & Seymour Manufacturing Company's** foundry department held their annual outing at East Litchfield early in August.

Fifteen barrels of dead fish, killed by chemicals in the water, were removed from the old mill pond of the **Coe Brass plant** recently. The fish were of the sucker variety. Chemicals in waste from another Torrington factory were believed to have been responsible for the trouble.

The **Torrington Electric Light Company** has elected the following directors: Frederick F. Fuessenich, Gideon H. Welch, James A. Doughty, John F. Alvord, Thomas W. Bryant, Frank E. Coe and Frank M. Travis. The directors have elected the following officers: President and treasurer, Frank M. Travis; secretary, Frederick F. Fuessenich; assistant secretary, H. B. Fuessenich; assistant treasurer, Clayton E. Smith.

The directors of the **Torrington Company**, of Connecticut, were re-elected at the annual meeting held here during the past month.

F. M. Dodge, formerly with the **Excelsior Needle Company** here, but for the past 20 years a resident of Globe, Ariz., was in town during the past month renewing old acquaintances. Mr. Dodge is now with the Arizona Eastern Railroad.

Standard time will replace daylight saving time in the Torrington factories and other places of business on Sunday, October 31. Other Connecticut communities are to drop the daylight saving schedule on the same date.

INDIANAPOLIS, IND.

SEPTEMBER 7, 1920.

Announcement has been made that the **Henry Brass and Founding Company,** of Terre Haute, Ind., has begun operations. The company was founded last March by Michael Henry, an expert mechanic and an inventor holding a number of patents. Mr. Henry has, for the past nine years, been manager of the **Henry Grease Cup and Manufacturing Company,** of the same city. He interested some Terre Haute capital and incorporated the company at a capitalization of $40,000.

Plans have been completed for the construction of a factory building for the **Randall Foundry Company,** of Michigan City, Ind. The building will be 98 feet wide and 112 feet long. The building will be constructed by the company on separate contracts.

Announcement has been made of the formation of what will be known as the **Star Foundry Company,** of Evansville, Ind. The company will manufacture copper and other red metal castings and has a capital stock of $150,000. The directors of the new company are: Edward Klechle, F. L. Stoltz and William J. Abigt.

Officials of the **Marion Foundry Company,** of Marion, Ind., have announced that they have completed plans for the construction of a two-story administration building for the company. Bids will be sought shortly and it is hoped to have the building completed before the first of next year. The

building will be fireproof, of reinforced concrete and brick and will house all the offices of the company.

A new metal alloy which resists corrosion by acids and alkaline solutions is claimed to have been discovered and perfected in the metallurgical laboratory of the **Midwest Engine Company. John R. Wood,** president of the company, declares the metal will resist all acids except nitric, and almost all alkalis. The metal, which has been named "Meco," can be cast, rolled, welded or brazed without offering difficulties common to other acid-resisting metals.

The Hartford City Foundry Company, a new industry located at Hartford City, Ind., has started operations with ten moulders. Others will be employed soon. The company has orders sufficient to assure a steady run, officials say.

Several Indianapolis companies are planning to bid in the surplus stock of zinc which has been offered for sale by the navy department.

Largely because of the activity of the trade in civic matters, an industrial clinic, to care for victims of industrial accidents, has been established here and is already giving service for those injured in industry. The clinic is known as the Indianapolis Industrial Clinic and is the first of its kind in the city, although similar institutions have been operated in other industrial centers. Florence Martin, formerly superintendent of nurses at the City Hospital, and chief nurse of Base Hospital No. 32 in France, is the head nurse. She has three assistants and the work is under the supervision of two competent surgeons.

The following incorporations and certificates of dissolution have been filed with the secretary of state:

The Plymouth Metal Working Company, Plymouth, Ind., capital $50,000; manufacture of brass and copper frames and forms; directors, Fred B. Lang, Albert G. Ziesk and Charles J. Ruebling.

The Portland-Ayers Metal Works Company, Portland, Ind.; capital $150,000; metal products; directors: C. H. Ayers, W. R. Sprinkle and J. L. Nimal.

The Northwestern Machine Company, of Indianapolis, has reduced the number of its directors from five to three.

Rice Valve and Foundry Company, Indianapolis; capital $20,000; machinery and valves; directors: Reece Rice, Albert Wenner and Carl R. Reynolds.

DETROIT, MICHIGAN

SEPTEMBER 7, 1920.

The coal situation and lack of cars for shipping completed products are causing manufacturers in the metal industries more or less anxiety, and what is most disturbing is the fact that conditions within the next few months will grow worse instead of better. The lake routes are relieving congestion in the central west to a considerable extent, but these will be closed in the late fall. Heavy tonnage still is being shipped by motor truck, but this source is uncertain when bad weather sets in.

Fuel is hard to get and prices are going up. All this tends to slow down production which makes the industrial future for this section not so encouraging as a year ago at this time.

The automobile industry which consumes a large share of Detroit's brass, copper and aluminum, is holding up much stronger than any other line, although this, with the exception of a few of the great producing concerns, is slowing down to some extent. But conditions here and in the surrounding territory are much better than in other sections of the country, where the manufacture of automobiles is not the prevailing industry.

The report circulated in many sections of the country that great numbers of people were leaving Detroit because of business slump is entirely without foundation. Business, of course, is not so good as it was a year ago, but there is no great exodus nor is there likely to be. Rents still are high and it is almost impossible to obtain a desirable place where a workman can establish a permanent home. Those who have watched the automobile industry for many years see only a moderate and temporary curtailment of this industry, no matter what may happen to other lines in different parts of the country. Tight money has kept many people from buying cars, but this situation is not going to last long in this section, for the banks are reported jammed with ready money which they are hanging on to until after the presidential campaign is over and business conditions become settled. Lack of transportation and the inability to obtain fuel and raw materials are giving the most trouble. This will be a prevailing condition for many months, but manufacturers are becoming more accustomed to such handicaps and are able to combat them more successfully than they did a year or more ago.

ROCHESTER, N. Y.

SEPTEMBER 7, 1920.

Activity in the industrial plants employing metals has undergone a slowing down during the past month. Some have attributed this state of affairs to the heat, declaring that during the summer months there is always a market let-down in the amount of output. However, there are reports of over-production from some establishments, and there is no doubt that there has been a decided slakening in some of the big plants about Rochester.

Of course, it is quite natural that little information can be obtained from the institutions thus affected. The **Eastman Kodak** plants and the big **Bausch & Lomb** industrial plant are running at top speed. These big concerns are still behind in their orders and have been since the beginning of 1917. However, both plants will soon catch up, inasmuch as enormous strides have been made since early in the year.

The railroad situation in Rochester has improved during the past month, much to the satisfaction of both the purchasing and shipping ends of big industries. Deliveries of materials are much better. Some of the larger plants are now considering the matter of the forty per cent. increase in freight rates, one of the results of which, it is said, will be an increase of $1 per ton in the cost of coal to manufacturing establishments in this city.

There is no change in the market for copper in this city. The metal is obtainable in plenty, but it is believed that prices will stiffen presently. Demand for brass is unchanged. Since the Waterbury strike has been settled the metal is obtainable in larger quantities and more promptly. Aluminum is difficult to obtain and is 4½c higher at this point. The bulk of the metal is shipped here from Pittsburgh, Niagara Falls and Toronto, duty paid. The tin market is quiet, as lead and zinc.

With the formation of the **Rochester Castings Company,** a new and what is said to promise in time to be a big industry, will be located in this city. The company is to be incorporated for $2,000,000, of which $1,000,000 will be paid in. The men behind the new corporation are Charles F. Wray, secretary and treasurer of Henry Wray & Son, brass founders; Albert N. Wright, secretary and treasurer of Wright & Alexander; George S. Benedict, pattern manufacturer; L. O. Graves, president of the Graves Elevator Company, Inc., and John M. Stull, former Corporation Counsel of Rochester. The first building, to be erected at once, will be 400 feet long, and constructed of brick and steel. It will be located on the company's 39-acre tract near the Buffalo, Rochester & Pittsburgh Railroad at Field road.

The General Electric Company has purchased a second plant of the **Symington Machine Corporation**—the plant used for making munitions in Leighton avenue during the war. **The General Electric Company** will use the new plant for the making of induction motors, and operations will begin in October.

PROVIDENCE, R. I.

SEPTEMBER 7, 1920.

Business in the metal industries throughout Rhode Island so far this year has continued with steady activity, although not at the high tension pressure that had prevailed previous to the New Year for upwards of four years. The closing days of August, however, finds an increasing tendency toward curtailment and the general indications are that the remainder of the year will show a gradual falling off in the volume of trade. A number of plants are still being driven at capacity, but the majority are slacking down, and very few, if any, of the plants are working more than a day shift, whereas, until comparatively recently, day and night shifts have been the rule. The closing down to shorter time of the textile industries is being reflected in the metal lines,

especially those concerns that manufacture textile machinery and findings.

While business has fallen off to a considerable extent among the various branches of the manufacturing jewelry industry, the concerns connected with the chain-making lines are unusually busy and calling for additional help. Experts in these lines, however, are difficult to obtain notwithstanding that as high as $1.25 and $1.50 an hour is being paid.

Plans for building an addition are being considered by the **Standard Nut and Bolt Company,** of Valley Falls. These call for a new structure, 80 by 60 feet, of wood, and the proposed addition will comprise a basement and one story.

The **Whiting & Davis Company,** of Plainville, has been granted a charter by the commissioner of corporations to conduct the jewelry business heretofore conducted by Whiting & Davis, a partnership. The officers of the corporation are as follows: Charles A. Whiting, president and treasurer; Byron Gardiner, secretary; Frank Whiting, Walter Rice and Frederick Cook, directors.

A charter has been granted to the **Alfred Vester Sons, Inc.,** by the Secretary of State under the laws of Rhode Island, to be located in Providence, and manufacture, buy and sell metal goods, with a capitalization of $50,000. The incorporators are William W. Moss, Charles R. Haslam and Thomas G. Bradshaw.

The Ford-Perry Company, of this city, has increased its capital stock from $50,000 to $125,000, according to an amendment in its charter filed at the office of the Secretary of State.

The **Smith Process Company,** of Attleboro, has been granted a charter by the commissioner of corporations of Massachusetts, to conduct an electro-plating business. The capital stock of the company is $25,000, consisting of 1,667 shares of preferred and 833 shares of common stock of the par value of $10 each. The officers and directors of the company are as follows: Joseph A. Smith, of Attleboro, who subscribes to 834 shares of preferred and 417 shares of common stock, president and treasurer; William J. Duffy, of Attleboro, who subscribes to one share each of preferred and common stock, and Louis P. Soucy, of Taunton, who subscribes to one share each of preferred and common stock. All of the stock subscribed for is payable in cash.

Gustave Collins, Charles Skiglund and Victor B. Lundquist, all of Providence, have filed articles of association with Secretary of State Parker under the laws of Rhode Island for the purpose of manufacturing, buying and selling metal products, to be located in this city, with a capital stock of $10,000, under the name of the Atlas Sheet Metal Company, Inc.

The **American Sheet Metal Works,** 24 Robinson street, is being conducted by Samuel Salk and George Goodman, according to their statement filed at the office of the city clerk.

Business is brisk at the plant of the **R. Plews Manufacturing Company,** Center Falls, manufacturers of tin cylinders and sheet metal workers. One of the drawbacks complained of, however, is that of the inability to obtain the kind of help required in the line of work carried on by the concern. The wages now being paid are more than double what were paid formerly but that is not sufficient incentive for men skilled in the business to apply for work. Another source of trouble encountered by the concern is the difficulty in getting the material used in the business on account of the railroad embargoes and freight congestions. Otherwise the outlook is extremely bright, with all the orders on hand that the firm can possibly fill before the end of the year.

The **Valley Falls Foundry and Machine Company,** of Cumberland has been incorporated with the Secretary of State under the laws of Rhode Island, for the purpose of manufacturing machinery and metal products of all kinds. The capital stock is $150,000, divided into 1,500 shares of $100 each. The incorporators are John F. Murphy, of West Warwick; Frederick A. Tobin, of East Providence, and Joseph F. McSoley, of Providence.

The plant of the **Nelson Rivet Company,** at Raynham, five miles from Taunton, was totally destroyed by fire on the night of August 13. The loss is estimated at $30,000 and is covered to the extent of $15,000, the amount in which the building and machinery were insured. The factory was a three-story wooden structure and the blaze is thought to have started in the annealing room. Two men were severely burned by the bursting of the gasoline tank.

The abandoned street railroad power plant in the village of Rehoboth, that has been unoccupied for several years, is to be started up as a stove enameling plant and the alterations for the installing of the necessary machinery will be started in a short time. The land and buildings have been sold to **Oscar G. Thomas,** representing the **Leonard & Baker** stove foundry, of Taunton, Mass., and the **Barstow Stove Company,** of Providence. It has been announced that a corporation will be formed by the new owners, and ranges for all the foundries connected with the purchasers will be enameled at the new plant.

CLEVELAND, OHIO

SEPTEMBER 7, 1920.

The turn into the first fall month of the year finds the metal and allied industries in more optimistic mood, and this means a better business outlook than has been seen here for some months past. Just as the Cleveland industrial situation boomed at the beginning of the war and went still higher in the business scale when this country went into the war, so the reaction seems to have appeared first in this section. Significantly enough, the reaction has had but temporary effect upon business generally, and a turn for the better in the last few weeks is significant.

The key to the industrial situation here, and upon which the metal trades as a whole may be said to depend, is the automobile manufacturing. Careful survey of this branch of activity in an effort to ascertain the true conditions, results in finding that the motor car manufacturers are in a more sanguine frame of mind today than they have been for six months past. It is admitted there has been a slump in buying of motor cars, and a consequent retrenchment in production. The cause for this, the motor car industry as a whole agrees, has been due to tightening of loans by banks and other financial interests. Heretofore, in the sale of a car, all a dealer had to do was get a down payment, a note for the balance from the purchaser, go to the bank, cash the note, and get the car from the factory. Upon turning the car over to the purchaser, he received the balance of cash, turned it over to the bank, and took up his note. The banks do not want these notes just now. Cash alone talks with the car seller. He has to extend himself to sell them. And he is doing just that.

During this readjustment in motor car selling the entire trade, and the industries allied with it, have been affected. Now that this phase of distribution is being stabilized, the entire business structure of the district seems more stable.

Several motor car manufacturers report they will continue to the schedule of production they have planned for the year. Others, newer producers, will go ahead with their plans for production on an average of 40 to 60 cars a day. Where production has been curtailed, it is again being increased.

Resumption of normal outlet of brass, copper, nickel and other materials in the plumbing branch of the trade is seen with the final settlement of the strike of journeymen plumbers, which lasted from June 1 to August 23. About the only work done during that period was by practical contractors. They were occupied largely on old work, and were not in a position to accept new business, even though there was little of this coming forward. The controversy arose over the demands of the journeymen for increased wages to $12 a day, with contractors furnishing all tools. Contractors offered $10 a day and journeymen to furnish their own tools. A compromise was reached between representatives of the union and the Associated Plumbing Contractors of Cleveland, in the union accepting $11 a day and furnish their own tools. There has been an accumulation of some materials here, and this, with the added impetus the resumption of normal work will create, is expected to see a marked revival for this branch of the metal industry.

Another new company for this territory will be the **American Piston Company,** incorporated for $100,000 early in August. The company has been formed for the purpose of licensing other companies to manufacture a new type of slipper skeleton piston, invented by C. C. Anderson, of Cedar Rapids, Iowa. The holding company will be located at Bowling Green, Ohio, and incorporators include C. C. Freeman, W. W. Cook, H. H. Elwood, J. W. White, Earl D. Bloom.

It is significant that the last few weeks has been productive of many enterprises, indicating a progress ahead, instead of the continuance of retrenchment that was expected with the early summer slump. One of the larger projects that will mean additional outlet will be the construction of a new building for the **Brown Auto Body Company,** with 15,000

square feet of floor space on one floor. The **Windau Tool Company** is expanding by the acquisition of a two-story building about a mile east of Public Square. **A. Rickersberg,** president of the **Rickersberg Brass Company,** announces the plan of his company for the erection of a one-story foundry building adjoining the present plant at Perkins avenue and East 37th street. This improvement is to take care of increased output of material.

COLUMBUS, OHIO

SEPTEMBER 7, 1920.

The metal market in Columbus and central Ohio territory is showing considerable strength. Buying of all metals is reported as more active and, with an improvement in the railroad situation, shipments are coming in much better than formerly. Metal-using concerns are entering the market and placing orders for immediate delivery, hoping to have shipments made before the advance in freight rates becomes effective.

There is still considerable uncertainty in the future and consumers are only buying for the immediate future. There is no disposition to stock up, as it is believed that some radical price changes may take place. Some people believe that metals have about reached the bottom for the time being and are therefore inclined to take more of a chance. Taking it all in all, the tone of the market is fair and prospects for the future are quite good.

Copper and brass sell about the same levels as was the case a month ago. Aluminum is in fair demand and prices rule steady. Babbitt metal and type metals are selling quite briskly and prices are stronger all along the line. Other metals show very little change from the previous month.

Registration of the trademark "Victory," accompanied by the figure of a dove, for use on babbitt metals of the **Ohio Metal Company,** of Columbus, has been secured through application with the federal patent office. The registration certificate was recently secured.

The **Cincinnati Molding Company,** has been chartered with a capital of $10,000 to manufacture molded and metal specialties. The incorporators are Renter W. Brodersen, Gottfried J. Joehnk, Elsa J. Brodersen, Edward J. Goetz and Harry C. Goetz.

TRENTON, N. J.

SEPTEMBER 7, 1920.

Although the Trenton metal manufacturers are holding their own at the present time many concerns are holding back from building, believing that there will be a drop in prices of material. One manufacturer says that he believes the prices will not take a downward course for another year at least. Manufacturers and contractors are urged to build now. The shortage of tin cans for the packing industries has reached a serious stage. It is blamed upon the general industrial conditions that have resulted from the railroad congestion, fuel shortage and labor trouble.

With a total production value of approximately $200,000,000, industries of Trenton established new records for the past year. It was the best year in the industrial history of Trenton and the prosperity of the manufacturing plants was liberally shared by the employes. The earnings of the workers amounted to $36,399,652.

The New Jersey Refinishing Company has found it necessary to find larger quarters. The company has begun the erection of a plant on a large plot of ground at Spring Lake, N. J. When completed the new building will be 30 feet wide and 60 feet deep, will be operated by steam, with seven buffing machines, and will be equipped to handle business for the years to come. Harry Todd is president of the company, while Fred I. Waters is the secretary and treasurer. The company began business operations only last spring and has already built up a large trade.

Suit to recover $653,215, plus interest, from the Alien Property Custodian and the treasurer of the United States has been begun by the **Bronze Powder Works Company,** of 803 Magnolia avenue, Elizabeth, N. J., which purchased the property from the alien property custodian following its seizure during the war from the **Bronzefarbenwerke Aktien Gesellschaft,** a German concern. The case will be heard in the United States District Court at Trenton during the fall term.

The Bronze Powder Works alleged that the amount which is sought to be recovered represented the amount which was seized by the alien property custodian. When the factory was purchased from the latter it is alleged that this amount should have been turned over to the purchasers.

Carl Schlenk, the former owner of the German concern, has been notified to testify in the case. The complainant asks that the interest on the money should start from January 31, 1917, and continue up until the time the money is turned over to the Bronze Powder Works.

Steib-Trahuian Company, of Irvington, N. J., has been incorporated at Trenton, N. J., with $100,000 capital, to deal in tin, etc. The incorporators are: Adam Meister, J. R. Trahuian and J. G. Steib, all of Irvington, N. J.

The Union Hardware Company, of Elizabeth, N. J., has been incorporated, with $75,000 capital stock, to manufacture hardware. There are 750 shares with a par value of $100 each. The incorporators are Frederick L. Haesloop, of 522 Walnut street, Roselle Pary, N. J.; Henry F. Romer, of 152 Sayre street, Elizabeth, N. J., and M. J. Gilmour, of Jersey City, N. J.

Rupp-Moore Company, Inc., of Collingswood, N. J., has been incorporated at Trenton with $100,000 capital stock, to manufacture and deal in metal novelties, etc. The incorporators are: R. M. Rupp, of Hagerstown, Md.; T. J. Moore and M. G. Moore, of Collingswood, N. J.

Goerdes-Mersfelder, Inc., of Newark, N. J., has been incorporated at Trenton, with $50,000 capital stock, to deal in metal novelties, etc. The incorporators are: F. W. Goerdes, of Orange, N. J.; Louis Mersfelder and Albert Mersfelder, of Newark, N. J.

The American Bosch Magneto Company, a corporation which operates in New Jersey, and which has its principal office at 223 West Forty-sixth street, New York City, has filed a certificate in the office of Secretary of State Martin, at Trenton, N. J., increasing its capital stock from $2,500,000 to $2,580,000.

The Atlantic Smelting Company, 415 Doremus avenue, Newark, N. J., has taken out a permit for a number of alterations to the factory buildings. The cost is estimated at $10,000.

Harry F. Porter, treasurer and works manager of the Ajax Electrothermic Corporation, of Trenton, N. J., and Miss Rosalind Bement, of Lansing, Mich., were recently married. Mr. Porter is a graduate of Princeton University, the degree of electrical engineer.

The employes of the **Jordan L. Mott Company** recently held their annual outing at the White City Park, Trenton. Boxing bouts featured the sporting program.

Clinton B. Higgins, who was engaged in the sheet metal business at Trenton, N. J., for the past twenty-five years, has disposed of his works at Hillcrest. Mr. Higgins is now on an auto trip from New Jersey to California and is camping en route. The Higgins family will later make their permanent home in California. Mr. Higgins served as an apprentice for the Dunn Hardware Company, Trenton, N. J., many years ago.

The V. R. H. Corporation, general agents for manufacturers dealing in brass and bronze castings and aluminum, has been incorporated at Trenton with $100,000 capital stock. The incorporators are: F. Van Tassel, B. K. Ringkamp and P. Hobson. The company has an office in the Gundling building, Trenton.

The John A. Roebling's Sons Company has established a cafeteria for its 2,500 employes at the Roebling, N. J., plant. The company has also established shower baths at the plant, and has made working conditions to suit the men.

The Westinghouse Lamp Company has purchased a plot of ground, two and a half acres, close to the Bloomfield, N. J., plant, as a site for a large addition.

The Interstate Smelting and Refining Company, of 29 Commercial avenue, Newark, N. J., has purchased a plot of ground and is said to be planning a new plant.

The Libby Welding Company has been incorporated at Trenton, N. J., with a capital of $50,000, by Clifford S. Libby, Lewis K. Schwartz and Frank P. Russell, all of Newark, N. J.

The Keystone Sheet and Metal Works, Inc., has been organized with a capital of $10,000. The incorporators are Samuel Ribbel, Paul Kalin and Adolph Wasserber.

New Jersey Gas and Electric Appliance Company, of Newark, N. J., has been incorporated with $25,000 capital, to manufacture and deal in gas and electric appliances. The incorporators are: Max Gray and H. N. Sklar, of Newark, and J. D. Grady, of Nutley, N. J.

Volk Manufacturing Company, of Jersey City, N. J., has been incorporated, with 1,500 shares of capital, with no nominal or par value, to manufacture and deal in electrical supplies. The incorporators are: H. A. Black, A. F. McCabe, and J. R. Turner, all of Jersey City, N. J.

SAN FRANCISCO, CALIF.

SEPTEMBER 7, 1920.

Electrical machinery is being installed in the mint, as the means of increasing many fold the output of minor coinage. In a short time, the old processes of melting and molding copper and nickel —in vogue since the erection of the building back in 1874—are to be changed completely. Electrical power will do away with many of the present methods.

The most radical innovation of the new equipment is an electrical furnace. It is described technically as a Rennerfelt melting furnace, two phase, three-wired, sixty cycles, and of 1,000 pounds capacity. Its installation made necessary the rearrangement of a large part of an entire story. Many of the thick stone columns, built when the earthquake of '68 was still fresh in the memory of the architect, had to be removed, and box girders substituted to support the floor above.

The furnaces, when completed, will be the pivotal point in a practically automatic process for the treatment of copper, from the time it comes into the building, in its raw state, until it is in pennies, ready for the sub-treasury.

Receiving the copper from automatic conveyors, the furnace will melt up 1,000 pounds of the metal at a time, as against the fifty pound capacity of the furnaces now in use. The molten copper will next be poured from crane-operated ladles into molds mounted on turntables. The automatic ladles are many times the size of the small hand dippers now used by the men in the melting room, and the ingots taken from the 150 pound molds just double the dimensions of the ingots obtained under present methods.

Holding the copper ingots in water until cooled is another tedious task that will also be done away with when the new apparatus is in use. For, after the ingots leave the turntable molds, they will pass upon another conveyor and be carried through a cooling tank and finally discharged upon a receiving table. A topping and grinding machine are in process of installation—the former to clip the ends of the ingots smooth, and the latter to remove the so-called "fins" from the edges. Both results are now obtained by hand filing.

SHIPPING PENNIES EAST.

An unusual procession, the largest of its kind ever held in San Francisco, passed down Fifth street to the freight yards on Townsend street, recently, when the United States Mint shipped East, in United States Express Company cars, 10,000,000 one-cent pieces. The latter were made up in sacks and were carried down to the cars by motor trucks.

Detectives guarded the shipment, which went to Chicago, Cincinnati and New Orleans. Chicago takes 5,000,000 of the pennies, and the others each take 2,500,000.

Superintendent of the Mint Shannon says the demand in the East for the penny and small silver coins continues unabated. There is a special demand for all kinds of subsidiary silver.

Owing to the Eastern demand, the local mint is working twenty-four hours, in three shifts. It is turning out 200,000 nickels per day. All told, it is now minting every twenty-four hours $90,000, in dimes, quarters and fifty-cent pieces, and $10,000 in nickels.

MINT DISCONTINUES MELTING SILVER DOLLARS.

The melting down of silver dollars, which has been responsible for the shipment out of this port to India and China of about $60,000,000, was stopped at the United States Mint.

The melting down of the dollars into bars has been almost continuous for many months, according to Superintendent T. W. H. Shannon of the Mint, and the silver dollars have not been coined since 1904.

Congress gave the authority for the melting down of $350,000,000 in silver coins. During the war the United States fixed the price of silver at $1.01 an ounce, but the fixed price was recently removed, the price going as high as $1.20 in New York City recently, and in London $1.21, the highest price since 1877.

LOUISVILLE, KY.

SEPTEMBER 7, 1920.

According to figures recently prepared there has been a sixty per cent. increase in industrial activity in Louisville in the past five years, there now being 1,247 manufacturing plants, as against 778 in 1914, an increase of 469. These figures do not include such big operations as the Standard Oil Company, Standard Sanitary Manufacturing Company, and other big concerns which have their main offices elsewhere.

With this increase there has been a demand from new lines for copper work, castings, brass work, etc., so that loss of the old distilling line, which was the chief business of Louisville coppersmiths, is not being felt to any extent. It is shown that there are 365 lines of endeavor in Louisville, which means that the demand for all lines is well diversified.

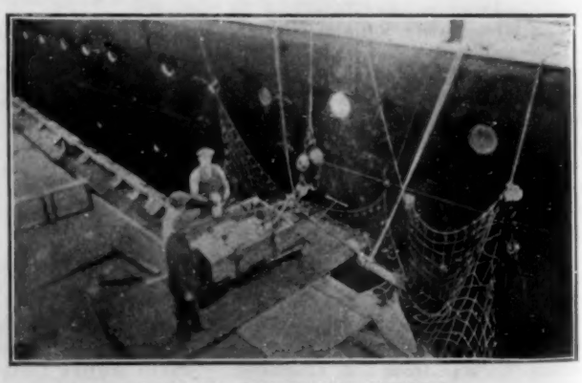
The coppersmiths of Louisville have just completed settlement of a three-weeks' strike over wages and hours, and it is interesting to note that the employers came out very well, having increased hours per day of labor, at a slightly higher rate per hour. It is reported that the new wage scale is practically the same as used in Cincinnati, and as used in Louisville, the agreement calls for: Forty-eight hours per week, 90 cents an hour for the first three months; 95 cents an hour for the next three months; $1 an hour for the next six months. Heretofore the men have been working forty-four hours a week for the past four or five years, and have been getting 80 cents an hour. They struck for $1 an hour and a forty-four-hour week.

Business as a whole is good, there being a very fair demand for both sheet metal work, and for castings, including aluminum, brass and copper work. Most of the plants appear to be good and busy on diversified work.

Hines & Ritchey and the **Standard Milk Machinery Company,** associated companies, have recently moved into the new plant, which has 16,000 feet of floor space on one floor, with all operations there.

E. E. Sherman, of the **Vendome Copper & Brass Company,** and also the **Louisville Aluminum & Brass Foundry,** in discussing conditions said: "While we haven't any great amount of big work, still we are getting a good run of various kinds of work, and are very busy. We are getting a lot of aluminum casting work of various kinds, and are glad that we established the new company. We expect to get into the larger aluminum casting work later, and plan to make anything up to an automobile crank case."

The Kentucky Wagon Manufacturing Company recently announced plans for additions to cost about $1,000,000, which will probably be started next year if conditions are right.



LOADING SILVER FOR EXPORT.

Sheet metal shops will be enlarged as well as foundries and drop forging departments.

The Probst Sheet Metal Company, Covington, Ky., capital $50,000, has been organized to manufacture material for general structural or building enterprises. E. R. Probst, O. J. Carpenter and J. B. Heizer are the principals.

Announcement was made a few days ago to the effect that the **U. S. Foil Company**, manufacturers of tin foil, controlled by the **Reynolds Corporation,** tobacco manufacturers, will double the capacity of the tin foil plant at Louisville, enlarging the plant and increasing the number of employes.

The Standard Sanitary Manufacturing Company, Louisville, is spending $20,000 in additions to its core plant in the brass casting department of the Louisville mills.

MONTREAL, CANADA

SEPTEMBER 7, 1920.

The business outlook in the metal manufacturing lines in Montreal appears more brisk as compared with the two preceding months. There is still considerable uncertainty as to the future, but metal-using firms are now buying considerable amounts of metals to replenish their depleted stocks.

While there are some who feel that prices may begin to take a drop, manufacturers are inclined to see that it will not take place this year.

As the trade in the machine tool market throughout Canada is always reported at this time of the year to be quiet, it is stated that local conditions in Montreal are not exceptions to this general rule. However, as in other trades in the metal business pending the fall rush of business, this period is looked upon in a mild way as the calm before the storm.

In discussing local trade prospects for this season, C. F. Foss, of the Foss Machinery and Supply Company, Limited, St. James street, said that a decided improvement was looked for and that business promised to be brisk. Two important factors in the trade which have been curtailing production for some time presented a more hopeful front, namely, the labor difficulties and the tightness of money. Mr. Foss said he believed these hindrances would be removed to a great extent this fall, with the result that the state of the machine tool trade would be materially better.

In regard to prices, present indications do not appear to suggest any decline for the near future for the principal lines. This is partly due to the great scarcity of raw materials of which the markets are bare. In second-hand machine tools and machinery the trend is downward. Prices in these lines are now at a much lower level than they have been for some time.

During this week it has been decided that the International Nickel Company is to erect a new rolling mill at Sudbury, Ont., costing $3,000,000. The plant is to be used exclusively for the rolling of Monel metal, which is now being done at Bayonne, N. J., and eventually all the operations will be carried out in Canada, either at Sudbury and Copper Cliff plants or at the recently established refinery at Port Colborne, Ont.

The Simmons Bedstead Company, Limited, are now occupying the new additions to their plant, located at De Courcelles and St. Ambrose streets, and is now operating under the new name as the Canadian plant of the Simmons Bedstead Company, Kenosha, Wis., U. S. A.

BIRMINGHAM, ENGLAND

AUGUST 30, 1920.

Manufacturers in the British metal trades report in some departments a slight falling off in foreign business. There is still greater slackening in home business, especially for articles for retail sale. This is attributed to high prices and a reduction in spending power. In spite of this slackening in new business manufacturers are exceedingly busy in working off old orders, and it is not expected that for some time to come there will be any lack of employment. The luxury trades are feeling this the most, the jewelry trade, for instance, being very quiet. Electroplaters are still very busy. There is not much demand for the decorative and more expensive lines, but articles of utility, such as spoons and forks ,are in very great demand. There is a difficulty in executing orders owing to a shortage of labor in the rolling departments which produce the blanks.

All the rolling mills are very busy and the makers of small tubes will require many months before they can overtake their orders. There is a general shortage of metal sheets and inquiries from the Continent have been turned down by a number of firms in the Birmingham district. The demand for steam and water fittings continues very great for builders. Brass foundry generally, inquiries are increasing owing to the speeding up of the schemes which are being initiated by the Government and the municipalities to meet the great shortage in houses. Export business in all kinds of brass fittings, including door and window furniture generally and brass work for internal ships' fittings is still very good. Makers of ship berths have orders which will keep them busy far into next year. There is a great increase in the demand for oil lamps both for lighting and for heating. The motor car trade is making large demands upon the lamp manufacturers. A shortage of sheets is handicapping the lamp and some other trades.

In the motor car trade there has been a decided slump. This is attributed to the high prices which manufacturers are forced to charge on account of the increased cost of material and the slow rate of production which has resulted from the shortening of working hours. At some of the larger motor car works a number of hands have been discharged.

The labor problem continues perplexing. Under what is known as the engineering agreement, the Industrial Court in London recently made its fore-monthly review of the situation. The engineering and foundry workpeople who are the principal parties to the agreement applied for an increase of 10s. a week on the ground of increase in the cost of living. The application was opposed by the employers, who contended that a further increase in labor cost at the present critical time would mean a serious loss of business. The court decided against the increase. The engineers are expressing dissatisfaction with the award and it will depend upon the action they take and its results whether or not the metal trades persevere with their claim for an increase. Conferences are going on with the engineering employers as to the adoption of payment by results and the question of overtime. The amalgamated Society of Engineers has pronounced against the working of overtime even for repairs or renewals and is asking the branches to prohibit it except in cases in which life and limb may be involved.

VERIFIED NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

Beer, Sondheimer and Company, 61 Broadway, New York City, have changed their name to International Minerals and Metals Corporation. All business transactions will hereafter be in that name. The active business management of the corporation and its relationship to its affiliated and subsidiary companies has in no way been affected and will continue as heretofore.

The Associated General Contractors of America have changed their address from 111 W. Washington St., Chicago, Ill., to 1038 Munsey Bldg., Washington, D. C.

The Metal & Thermit Corporation, New York, N. Y., has made arrangements to secure life insurance for all its employes who have served the company for at least six months. The amount of protection is graded according to the length of service, ranging from $700 for six months' service, up to $3,000 for twenty years' service. The company bears the entire expense of this insurance, which is in addition to any compensation to which its employes might be entitled under the present State Compensation Laws. The insurance will be paid in monthly payments during the first year after death.

The Light Alloys Company, Painesville, Ohio, will build a one-story brick and steel foundry 75 x 120 ft. It was recently organized, with Norman Craig as president. Contract has been placed with the H. K. Ferguson Company, Cleveland. This firm operates an aluminum foundry.

The Detroit Valve and Fittings, and **Detroit Brass Works,** Detroit, Mich., have changed their name to the Detroit Brass & Malleable Works. There is no change in the policy of management and the same personnel of the company will be retained.

The American Metallurgical Corporation, Phildadelphia, Pa., announce that they have sold their 40% of holdings in the Philadelphia Electric Steel Castings Company, to the recent purchaser of the plant, thereby withdrawing entirely

from any interest, both in connection with finances or in connection with the service of any of its officials.

The North Star Plating Works, 77 Traverse street, Boston, Mass., have sold the buffing department of their plant, together with the name of North Star Plating Works. They will continue a tumbling barrel business at the same address under the name of the Boston Tumble Barrel Plating Works.

The Mesta Machine Company, Pittsburgh, Pa., has opened an office in the Singer Building, New York, from which it will handle all its foreign business. All foreign correspondence should be addressed to the company at New York. The New York office will also be the sales office for the New York and Eastern States territory. M. M. Moore, the Export Sales Manager, who has just returned from a several months' European trip, will be in charge.

The Egyptian Lacquer Manufacturing Company, has removed its offices to 5 East 40th street, near Fifth avenue, New York, where it will occupy a five-story granite office building of latest construction in every respect, both interior and exterior, which it has erected and owns.

The American Magnesium Corporation announces the appointment of the **Aluminum Company of America** as its exclusive sales agent.

The New Jersey Zinc Company's display at the Sixth Annual Chemical Exposition, to be held during the week of September 20, at Grand Central Palace, will occupy booth No. 9 and a portion of booth No. 8, on the main floor. One of its features will be an exhibit indicating the route of the zinc ore in the manufacture of zinc products, as well as illustrating the ultimate uses of these products. Various products of the "Horse Head" family will be displayed. These will include zinc oxide, lithopone, albalith, a new light-resisting pigment, ochre, slab zinc, boiler plates, spiegeleisen, zinc dust, muriatic acid, salt cake, sulphuric acid and zinc chloride. W. Homer Hendricks, general sales engineer, will be in charge. S. T. Ballinger, master painter, will assist him.

Jenkins Brothers, 80 White street, New York, will in the near future increase their manufacturing facilities by owning and operating a plant in Bridgeport, Conn. This plant will be devoted entirely to the manufacture of the Jenkins Valve—an engineering product which dates back to 1865, when Nathaniel Jenkins invented and first introduced the renewable disc type of valve. The heirs of the founder of the business continue to hold the controlling interest in the company. The present head of the company is Farnham Yardley. Frank T. Swain is vice-president. The manufacture of the Jenkins Discs, Sheet Packings, Pump Valves and other mechanical rubber goods, will be continued at Elizabeth, N. J. The Canadian Branch, Jenkins Brothers, Limited, of Montreal, have recently completed alterations and additions to their brass valve department, and now have in course of construction, a new 192-ft. x 80-ft. iron valve foundry. The Canadian branch supplies Jenkins valves throughout Canada and foreign countries, while the Bridgeport plant will make valves for use in the United States and Insular possessions.

TRADE PUBLICATIONS

Case Carbonizing.—A book arranged by the Driver-Harris Company, Harrison, N. J., in which they have compiled considerable information pertaining to modern standardized heat treatment methods, as practiced in the various industries throughout the country.

Moulds.—A catalogue from Charles K. Schweizer & Company, St. Louis, Mo., on solder, babbitt, block lead, tin, linotype, individual and cup moulds, showing a complete line of moulds for all purposes of the white metal trade.

Massco Furnaces—Bulletin No. 63, a very attractive and interesting catalogue issued by The Mine and Smelter Supply Company, New York, N. Y. It describes and illustrates a complete line of furnaces for melting, hardening, tempering, annealing, forging, assay work, ore roasting, etc.

Shops for the B. & O.—A folder issued by Dwight P. Robinson & Company, New York City, showing the layout and construction of the new shops for all purposes for the Baltimore & Ohio Railroad at Glenwood, Pa., and Cumberland, Md.

Hytempite in the Gas Plant—An illustrated booklet issued by the Quigley Furnace Specialties Company, New York City, showing the uses of Hytempite in gas manufacturing plants.

Die Castings.—A number of illustrated folders and booklets issued by the Doehler Die Casting Company, Brooklyn, on die castings which they produce, among which are the following: Die castings in white metal alloys, aluminum die castings, finished brass castings, babbitt lined bronze bearings, babbitt aluminum bearings. Also a very interesting and well arranged booklet entitled "Building Up an Industry," which gives the history of the Doehler Die-Casting Company from its inception.

Engineers Unite.—A compilation of the reports of the conference of the Federated American Engineering Societies, held in Washington, June 3 and 4, 1920, published by the McGraw-Hill Company, New York City.

Electrical Supplies and Machinery.—A series of bulletins issued by the General Electric Company, Schenectady, N. Y., covering the following: Bulletin No. 4940, the Hewlett Link Insulator, for power cable transmission; Bulletin No. 41311 Synchronous Condensers; Bulletin No. 48,715 Insulating Fabrics; Bulletin No. 41,021-A, Adjustable Speed Motors; Bulletin No. 46,112, Deflection Potentiometers; Bulletin No. 48,704-A, Insulating Compounds.

RENEWING METAL LACQUERS

Dealers in lighting fixtures, plumbing supplies, hardware, metal beds, etc., sell a great many lacquered goods. After a time the lacquer wears off, especially in case of articles subjected to wear or much handling. When the metal is exposed it oxidizes and loses its attractive appearance. At this point many customers register complaints in relation to the quality or durability of the goods.

The best answer to these complaints is the suggestion that the customer purchase a package of the same lacquer used on the goods when new. It is obtainable in combination packages, with thinner, sponge and brush; also directons for applying it. These directions are simple and easily carried out.

Dealers in lacquered metal goods should have on sale the relacquering materials. There's a profit in them, and the complaining customer is better satisfied if she can get them at once than if she has to hunt around several stores to find what it is suggested she use to renew her pieces, whatever they may be.

CIVIL SERVICE POSITIONS

The following positions are open in the Civil Service:

Metallurgical Laboratorian. Pay—$4.80 per diem. Apply for form 1312.

Laboratory Aid. Pay—$4 per diem. Apply for form 2118.

Catalytical Chemist. Pay—$3,000 to $4,000 a year.

Assistant Catalytical Chemist. Pay—$2,000 to $3,000 a year.

Junior Catalytical Chemist. Pay $1,600 to $2,000 a year. Apply for form 1312.

Laboratory Assistant, Intermediate Grade. Pay—$1,080 a year.

Laboratory Assistant, Junior Grade. Pay—$1,000 a year.

Senior Aid. Pay—$900 a year. Male and female. Apply for form 1312.

Associate Physicist Qualified in Physical Metallurgy. Pay—$2,000 to $2,800 a year.

Assistant Physicist Qualified in Physical Metallurgy. Pay—$1,400 to $1,800 a year.

METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America	$100	$600	$700
American Brass	100	192	196
American Hardware Corp	100	135	140
Bristol Brass	25	..	28
International Silver, com	100	25	30
International Silver, pfd	100	85	90
New Jersey Zinc	100	180	185
Rome Brass & Copper	100	135	145
Scovil Mfg. Co	100	370	405
Yale & Towne Mfg. Co	..	270	285

Corrected by J. K. Rice, Jr., & Co., 36 Wall Street, New York.

METAL MARKET REVIEW

WRITTEN FOR THE METAL INDUSTRY BY W. T. PARTRIDGE.

COPPER.

Buying of electrolytic copper by domestic consumers throughout August apparently was even smaller than in July, but it is notable that July transactions, according to late reports, amounted to 100,000,000 lbs., of which 50,000,000 lbs. were for export. Foreign consumers apparently bought less in August because of the very unfavorable exchange rates. On the other hand, it should be noted that where credit arrangements have been made covering a long period that the current rate for foreign exchange was less of a factor. The indication seems to be that August exports will not be far from 20,000 tons, or close to 25,000,000 lbs, but how much of this was sold in August will not develop for several weeks. The July exports were also approximately 20,000 tons, while actual sales were even greater. As nearly as can be determined, August sales on domestic and foreign account were in the neighborhood of 75,000,000 lbs.

Some sales of electrolytic copper in August were undoubtedly made at the expense of prices as some of the largest producers accepted contracts at 18¾ and 19c, delivered for this year's shipment. As freight rates advanced August 26th, and the increased cost of delivery was absorbed by producers, there was a further decline in prices in the major market.

In the outside market, the pressure to sell by second hands increased as the month advanced and with very little demand, the result was a decline of ¼ to ¾c per lb. On the closing day of the month sales of electrolytic were made at 18¼ f. o. b. refinery for September shipment, and at 18½ delivered in the interior and subject to a freight rate of 28c per 100 lbs.

Producers, however, are confident that consumers will come into the market for large tonnages, probably in October, or possibly in the latter part of September. Had it not been for labor strikes and traffic delays, shipments on contracts to home consumers would not have been held up, but as it was, about 60 days' consumption was lost during the first eight months of the year. It is estimated that domestic melting during the first eight months of the year was a little less than 800,000,000 lbs., or at the rate of about 100,000,000 a month, whereas during the first four months of the year consumption was at the rate of 130,000,000 lbs. a month.

In the last week or two there has been resumption of full operations at some of the plants of the largest consumers, including electrical equipment manufacturers and wire drawers. Foundries in the Connecticut Valley have also increased operations. It is expected that throughout September consumers' plants will be operating again at a rate which will call for 130,000,000 lbs. of copper a month. This is a most encouraging feature, but until shipments on contracts are more nearly completed no large new buying is to be expected.

TIN.

Fluctuations in the tin market during August covered a range of 3⅞c. per pound from the highest, 49.62½c. for Straits on August 5 and 6, to the lowest, 45¾c., on August 24 and 25. The opening was made at 48.50c. for Straits, 46.75c. for Banca, 46.50c. for American pure, and 44.50c. for 99% tin, these prices showing an advance of ¼c. per pound over the July closing. Changes were rapid and wide throughout the month, but the August closing at 46c. for Straits, 45.12½c. for Banca, 45.50c. for American pure, and 42.50c. for 99% metal, made the net decline on Straits only 2½c., on Banca 1⅝c., on American pure 1c., and on 99% tin, 2c. per pound. Trading during the month was active and largely of a speculative character, consumers not responding readily to the sensational changes. Arrivals were heavy, there being 5,075 tons received, making total arrivals 36,688 tons during first eight months 1920, as compared with total arrivals amounting to 35,404 tons in the entire twelve months of 1919. In this comparison, it must be remembered that during five months of 1919 importations were prohibited.

ZINC.

The zinc market in August opened at unchanged July closing prices, 7.70c. East St. Louis, 8.05c. New York, for prompt August shipments; September, October positions being offered at 5 points higher. The market being very dull, these figures were shaded on August 3, but with a sharp advance in London, and continued difficulties at producing plants in this country, curtailing output, the market became firm. On August 4, active demand from brass mills started an advance in prices that carried to 7.80c. East St. Louis, 8.15c. New York, the following day, these figures remaining unchanged until August 12, when another advance began, which on August 16 had carried upward to 8.00-8.05c. East St. Louis, 8.35-8.40c. New York. The market remained steady but quiet at the inside figures until August 21, when a rise at London, combined with increased activity in consumers' buying, carried prices to the highest level of the month, 8.15c. East St. Louis, 8.50c. New York, on August 24. At these figures the market turned quiet, with prices on August 31 being quoted on the basis of importations from the United Kingdom, and down to 8.00-8.10c. East St. Louis, 8.30-8.40c, New York. At these figures, a net rise of 30 points was indicated.

LEAD.

Sales of foreign lead in the open market in August, due to scarcity of domestic supply, was a feature of the month. The market opened at unchanged July closing, 8.80-8.90c. East St. Louis, 9.15-9.25c. New York, the leading interest quoting 8.25c. East St. Louis, 8.50c. New York. The market being very quiet, there was some shading of these prices, sales being made at inside figures until August 12, when the American Smelting & Refining Co. advanced its basis ½c. per pound to 8.75c. East St. Louis, 9.00c. New York. Quotations in the outside market on the same day being 9.00c. East St. Louis, 9.35c. New York. By August 16 foreign lead could be imported at ½c. per pound less than the so-called "official price." Outside market quotations were now up to 9.15c. East St. Louis, 9.50c. New York, the market remaining firm and steady at these figures until August 20, when prompt shipments at East St. Louis were shaded to 9.12½c. per pound, while New York quotations were unchanged. A slackening in demand in succeeding days, combined with an advance in London prices on August 23, brought about a decline which gradually carried prices to below the level of the leading interest, when on August 26 quotations were 8.75c. East St. Louis and New York in the outside market, these figures prevailing at the end of the month. As was the case with zinc, these prices were based upon offerings of imported lead. As a result of changes, there was a net rise of ½c. per pound in producers' prices and a net decline of 5 points in outside prices at East St. Louis, while in New York prices, the decline amounted to 40 points.

ALUMINUM.

The aluminum market during first fortnight in August was quoted at unchanged July figures, the Aluminum Company's schedule being 33c. for virgin 98-99%, 31.50c. for No. 12, and 44.20c. for sheet 18ga and heavier. The outside market was dull at 31.50-32.50c. for 98-99% virgin, 31.00-31.50c. for 98-99% remelted, and 29.50-30.50 for No. 12 remelted. On August 17, a new schedule was issued by the producer, with prices on 15 tons f. o. b. producing works sharply advanced to 35.10c. for 99% and purer, 34.90c. for 98-99% virgin, 34.10c. for No. 12 alloy and 49.20c. for sheet 18ga and heavier. In the open market, where plentiful supplies of imported aluminum exist, the response to the advance made by the leading interest was not so great as might have resulted if stocks had been depleted. On August 18, outside prices were quoted 32.50-33c. for virgin 98-99%, 32.00-33c. for 98-99% remelted, and 30.50-31.50c. for No. 12 remelted. Importations for prompt and September shipments from Europe on August 20, were offered at 30c. c. i. f. New York in bond, this price being equivalent to 32c. duty paid New York and ½c. below spot quotations. Previously the price of foreign aluminum had stood at 1c. per pound below domestic metal, but with the above offerings on the market foreign metal became available at about 3c. per pound less than domestic aluminum as given in the producer's schedule of prices. Owing to generally uncertain business conditions and the falling off in

demand from the automobile trade, there was small response to the lower prices. By August 25 quotations in the outside market were off to 32.00-32.50c. for virgin 98-99%, 31.50-32.00c. for remelted 98-99%, and 29.00-30c. for No. 12 remelted, these figures being quoted in an almost lifeless market over the remainder of the month, indicated a decline of ½c. per pound in asking prices, which, however, was merely nominal. Importers of Swiss and Norwegian metal, at the end of the month were meeting with small success in effecting sales, notwithstanding the lower prices. Consumers were well supplied and unwilling to accumulate further stocks.

ANTIMONY.

The downward trend in prices of antimony which has been going on during past six months was continued in August, the decline being ¼c. per pound from 7.25c., duty paid, for spot carloads, to 7.00c. The market at the end of the month was steady, demand being slightly improved, but stocks in this country were still heavy, there being no indication of any advance in prices in the near future.

SILVER.

Sensational developments in the open market for silver, due to renewed buying in the Far East,—by India, early in the month and by China, later in August,—carried prices of both domestic silver and silver of foreign origin, to $1.01¾ per ounce on August 20, this being the highest price quoted since last May. The advance in price of bar silver of foreign origin, noted toward the close of July, was continued in the August opening, at 93⅜c. per ounce, domestic silver being pegged at 99½c., below which figure it cannot pass by reason of provision in the Pittman act. The rise in prices of foreign silver was halted at 96c. on August 9. A decline then occurred carrying to 94⅝c. on August 11, following which another rise began, which culminated at $1.01¾c. per ounce August 20. These figures were quoted in the open market for silver of both domestic and foreign origin until August 23, when the decline in foreign silver carried to 97¼c. per ounce, and the American product again automatically became pegged at 99½c. Fluctuations over the remainder of the month in foreign silver carried to 96c. August 24 and then recovered to 98c. August 26. The closing made at 92¾c. per ounce, represented a net decline of ⅝c. per ounce during the month. Repurchases made by the U. S. Treasury Department, according to latest advices, now total 13,041,284 ounces. Importations of silver in June, according to U. S. Bureau of Statistics, amounted to $6,561,571. Exports of silver in June amounted to $4,415,614.

QUICKSILVER.

Due to continued arrivals of quicksilver, assuring plentiful supplies to meet the steady demand, prices in August gradually declined $13 per flask from $88 per flask of 75 pounds at the beginning of the month, to $75 on August 30, there being no further change on the last day of the month. This is the lowest price for quicksilver touched this year, the highest price being $103 per flask in April.

PLATINUM.

Platinum prices advanced sensationally during the past month, making a total rise of $35 from $80-85 quoted August 2, to $115-120 quoted August 20, and continued thereafter during the month. The first rise was $20 per ounce to $100-105 August 3, and the second $15 per ounce. The acute Polish situation was given as the determining factor, by reason of which supplies from Europe were completely cut off. Scarcity of metal in the face of continued active demand was, of course, the basic reason for the advance. Consumption of platinum is on a much larger scale than before the war.

OLD METALS.

While general conditions showed some small improvement during August, the volume of business transacted was small. Shipping difficulties, although somewhat relieved, continued to seriously hamper trading in old metals until late in the month when things were moving more readily. All things considered, prices were very well sustained. Toward the end of the month copper scrap was moving well at unchanged prices, 13.50c. for light copper, 15.50c. for strictly crucible, and 14.50c. for uncrucibled copper wire. Lead and zinc, after being quite active earlier in the month, were quiet at the close, quotations on lead remaining unchanged at 7.50c. for heavy lead, 5.00c. for tea lead and 4.00c. for battery scrap. New zinc was off ½c. to 6.50c. and old zinc was down ¼c. to 5.25c. per pound. Aluminum scrap, after being stagnant showed some life at the end, with clippings unchanged at 25c., old sheet off ½c. to 22c., and old cast aluminum down 2½c. from 22.50c. to 20c. per pound. Block tin pipe declined 3c., from 38 to 35c., and tin foil 1c., from 33c. to 32c. per pound. Other items were practically unchanged. Sentiment in some quarters of the trade seemed to forecast a further decline in prices, while in other sections confident assertions were to the effect that bottom prices had been reached and the next change would carry upward.

WATERBURY AVERAGE

Lake Copper. Average for 1919, 19.55. 1920—January, 19.25. February, 19.125.—March, 18.875.—April, 19.125.—May, 19.00.—June, 18.50—July, 19.00—August, 18.75.

Brass Mill Zinc. Average for 1919, 8. 1920—January, 9.75. February, 9.40.—March, 9:15.—April, 8.85.—May, 8.30.—June, 8.15.—July, 8.45.—August, 8.55.

AUGUST MOVEMENTS IN METALS

	Highest.	Lowest	Average.
Copper:			
Lake	18.85	18.50	18.722
Electrolytic	18.62½	18.25	18.440
Casting	18.00	18.00	18.000
Tin	44.75	41.75	43.409
Lead	9.50	8.75	9.182
Zinc (brass special)	8.50	8.02½	8.294
Antimony	7.25	7.00	7.04
Aluminum	32.75	32.00	32.216
Quicksilver (per flask)	$88.00	$75.00	83.318
Silver (cts. per oz.) Foreign	101.75	92.75	96.173

Metal Prices, September 7, 1920

NEW METALS

Open Market

	Cents.
COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER.	
Manufactured 5 per centum.	
Electrolytic, carload lots, delivered	18½-19
Lake, carload lots, delivered	18½-19
Casting, carload lots, delivered	18 -18½
TIN—Duty Free.	
Straits of Australian, carload lots	45¾
LEAD—Duty Pig, Bars and Old, 25%; pipe and	
Sheets, 20%. Pig lead, carload lots	8½-8¾
ZINC—Duty 15%.	
Brass Special	8¼
Prime Western, carload lots	8 -8¼
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory	....
100-lb., f. o. b. factory	....
Ton lots, f. o. b. factory	32-35.10
ANTIMONY—Duty 10%.	
Cookson's, Hallet's or American	Nominal
Chinese, Japanese, Wah Chang WCC, brand spot	7.00
NICKEL—Duty, Ingot, 10% ad valorem. Sheet, strip, strip and wire, 20%.	
Ingot	43.00
Shot	43.00
Electrolytic	45.00
MANGANESE METAL	Nominal
MAGNESIUM METAL—Duty 20% ad valorem (100 lb. lots)	$1.60-$1.85
BISMUTH—Duty free	$2.70-$2.72
CADMIUM—Duty free	$1.40-$1.50
CHROMIUM METAL—Duty free	Nominal
COBALT—97% pure	$2.50-$3.00
QUICKSILVER—Duty 10% per flask of 75 pounds	$75
PLATINUM—Duty free, per ounce	$115-$120
SILVER—Government assay—Duty free, per ounce	.99½
GOLD—Duty free, per ounce	$20.67

Metal Prices, September 7, 1920

INGOT METALS

Silicon Copper, 10%	according to quantity	49 to55
Silicon Copper, 20%	" " "	36 to40
Phosphor Copper, guaranteed 15%	" " "	25 to32
Phosphor Copper, guaranteed 10%	" " "	24 to31
Manganese Copper, 30%	" " "	60 to66
Phosphor Tin, guarantee 5%	" " "	60 to65
Phosphor Tin, no guarantee	" " "	55 to65
Brass Ingot, Yellow	" " "	13¾to16
Brass Ingot, Red	" " "	18½to21
Bronze Ingot	" " "	19 to21
Parsons Manganese Bronze Ingots	" " "	22½to24
Manganese Bronze Castings	" " "	32 to42
Manganese Bronze Ingots	" " "	19 to23
Manganese Bronze Forgings	" " "	30 to40
Phosphor Bronze	" " "	24 to30
Casting Aluminum Alloys	" " "	32 to34
Monel Metal	" " "	38 to..

OLD METALS

Buying Prices.		Selling Prices.
15 to15¼	Heavy Cut Copper	16¼to17
14¾to15	Copper Wire	16 to16½
13 to13½	Light Copper	15 to15½
14½to15	Heavy Machine Comp	16½to17
10½to11	Heavy Brass	12½to13
8 to 8½	Light Brass	10 to10½
9 to 9½	No. 1 Yellow Brass Turnings	11 to11½
14 to14½	No. 1 Comp. Turnings	16 to16½
4.25	Heavy Lead	4.90
4.25	Zinc Scrap	5.00
10 to13	Scrap Aluminum Turnings	11 to14
21 to23	Scrap Aluminum, cast alloyed	23.50to25
24.00	Scrap Aluminum, sheet (new)	26.50
36.00	No. 1 Pewter	40.00
18.00	Old Nickel anodes	20.00
26 to28	Old Nickel	30 to32

BRASS MATERIAL—MILL SHIPMENTS

In effect August 23, 1920.

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass.	Low Brass	Bronze.
Sheet	$0.25¼	$0.27¼	$0.29
Wire	.25¾	.27¾	.29½
Rod	.23¾	.28	.30
Brazed tubing	.38	..	.42¾
Open seam tubing	.38	..	.42¾
Angles and channels	.43	..	.47¾

To customers who buy less than 5,000 lbs. in one order.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze.
Sheet	$0.26½	$0.28½	$0.30¼
Wire	.27	.29	.30¾
Rod	.25	.29¼	.31¼
Brazed tubing	.39¼	..	.44
Open seam tubing	.39¼	..	.44
Angles and channels	.44¼	..	.49

SEAMLESS TUBING

Brass, 30½c. to 32½c. per lb. base.
Copper, 32c. to 34c. per lb. base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	29½c. net base
Muntz or Yellow Metal Sheating (14"x48")	25¾c. " "
Muntz or Yellow Rectangular Sheets other than Sheathing	26¾c. " "
Muntz or Yellow Metal Rod	23¾c. " "

Above are for 100 lbs. or more in one order.

COPPER SHEET

Mill shipments (hot rolled)	29½c. net base
From stock	33½c-35c net base

BARE COPPER WIRE—CARLOAD LOTS

22¾c. to 23¼c. per lb. base.

SOLDERING COPPERS

300 lbs. and over in one order	31½c. per lb. base
100 lbs. to 300 lbs. in one order	32½c. " " "

ZINC SHEET

Duty, sheet, 15%. Cents per lb

Carload lots, standard sizes and gauges, at mill, 12½c. basis less 8 per cent. discount.

Casks, jobbers' prices	14c.
Open casks, jobbers' prices	14½c

ALUMINUM SHEET AND ROD

Sheet Aluminum, base price, 54c. per lb. Coils 50c. per lb.

ROD.

B. & S. Gauge.

¼" to 1" Advancing by 32nds
1" to 2⅜" " " 16ths } 98% rolled, 43.10 cents per lb
2⅜" to 3½" " " 8ths

⅜" to ¼", 98% rolled and drawn ..... 48.80 cents per lb

BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c. over Pig Tin. 40 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 25 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. or more, 10c. over Pig Tin. 50 to 100 lbs., 15c. over, 25 to 50 lbs., 20c. over, less than 25 lbs., 25c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

MONEL METAL

Shot	35
Blocks	35
Sheet Bars	40
Hot Rolled Rods (base)	40
Cold Drawn Rods (base)	56
Hot Rolled Sheets (base)	55

Lead Foil—base price—figured on base price of lead at the time.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturer.

SILVER SHEET

Rolled silver anodes .999 fine are quoted at from 96½c. to 99c. per Troy ounce, depending upon quantity.

Rolled sterling silver, 92c. to 96c.

NICKEL ANODES

85 to 87% purity	.55c. per lb.
90 to 92% "	.57½c. per lb.
95 to 97% "	.60c. per lb.

Supply Prices, September 7, 1920

CHEMICALS

Acid—		
Boric (Boracic) Crystals	lb.	.30
Hydrochloric (Muriatic) Tech., 20 deg., Carboys	lb.	.08
Hydrochloric, C. P., 20 deg., Carboys	lb.	.10
Hydrofluoric, 30%	lb.	.50
Nitric, 36 deg. Carboys	100 lb.	8.28
Nitric, 42 deg. Carboys	100 lb.	8.90
Sulphuric, 66 deg., Carboys	lb.	.04½
Alcohol—		
Denatured	gal.	1.50
Alum—		
Lump, Barrels	lb.	.08
Powdered, Barrels	lb.	.09
Aluminum sulphate, commercial tech	lb.	.08
Aluminum chloride solution	lb.	.30
Ammonium—		
Sulphate, tech., Barrels	lb.	.08½
Sulphocyanide	lb.	1.50
Argols, white, see Cream of Tartar	lb.	.80
Arsenic, white, Kegs	lb.	.18
Asphaltum	lb.	.35
Benzol, pure	gal.	.75
Blue Vitriol, see Copper Sulphate.		
Borax Crystals (Sodium Biborate), Barrels	lb.	.10½
Calcium Carbonate (Precipitated Chalk)	lb.	.20
Carbon Bisulphide, Drums	lb.	.12
Chrome Green	lb.	—
Cobalt Chloride	lb.	2.00
Copper—		
Acetate	lb.	.60
Carbonate, Barrels	lb.	.29
Cyanide	lb.	.65
Sulphate, Barrels	lb.	.09
Copperas (Iron Sulphate, bbl.)	lb.	.04
Corrosive Sublimate, see Mercury Bichloride.		
Cream of Tartar, Crystals (Potassium bitartrate)	lb.	.80
Crocus	lb.	.15
Dextrin	lb.	.25
Emery Flour	lb.	.10
Flint, powdered	ton	—
Fluor-spar (Calcic fluoride)	ton	—
Fuel Oil	gal.	6.50
Gold Chloride	oz.	14.00
Gum—		
Sandarac	lb.	—
Shellac	lb.	—
Iron, Sulphate, see Copperas, bbl	lb.	.04
Lead Acetate (Sugar of Lead)	lb.	.35
Yellow Oxide (Litharge)	lb.	.25
Mercury Bichloride (Corrosive Sublimate)	lb.	1.95
Nickel—		
Carbonate Dry	lb.	.80
Chloride, 100 lb. lots	lb.	.65
Salts, single, bbls	lb.	.16
Salts, double, bbl	lb.	.14
Paraffin	lb.	.30
Phosphorus—Duty free, according to quality		.37-.45
Potash, Caustic, Electrolytic 88-92% fused	lb.	.32
Electrolytic 70-75%, fused	lb.	.26
Potassium Bichromate, Casks	lb.	.40
Carbonate, 80-85%	lb.	.23
Cyanide, 98-99½%, 100 lb. cases	lb.	—
Pumice, ground, bbls.	lb.	.05
Quartz, powdered	ton	—
Official	oz.	—
Rosin, bbls.	lb.	.08
Rouge, nickel, 100 lb. lots	lb.	.40
Silver and Gold	lb.	.60
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.17
Sal Soda	lb.	—
Silver Chloride, dry	oz.	1.43
Cyanide	oz.	—
Nitrate, 100 ounce lots	oz.	64¾
Soda Ash, 58%, bbls.	lb.	.04
Sodium—		
Biborate, see Borax, bbls.	lb.	.10½
Bisulphite, tech. bbls.	lb.	.11
Cyanide, 96 to 98%, 100 lbs.	lb.	.27
Hydrate (Caustic Soda) bbls.	lb.	.08
Hyposulphite, 100 lb. lots	lb.	.06
Nitrate, tech., bags	lb.	.08
Phosphate, tech.	lb.	.14
Silicate (Water Glass) bbls.	lb.	.03
Sulpho Cyanide	lb.	.80
Soot, Calcined	lb.	—
Sugar of Lead, see Lead Acetate	lb.	.35
Sulphur (Brimstone) bbls.	lb.	.04
Tin Chloride	lb.	.65
Tripoli Composition	lb.	.½
Verdigris, see Copper Acetate	lb.	
Water Glass, see Sodium Silicate, bbls.	lb.	.03
Wax—		
Bees, white ref. bleached	lb.	1.00
Yellow No. 1	lb.	.60
Whiting	lb.	.10
Zinc, Carbonate, bbls.	lb.	.20
Chloride, 600 lb lots	lb.	.15
Cyanide	lb.	.45
Sulphate, bbls.	lb.	.04½

COTTON BUFFS

Open buffs, per 100 sections (nominal).		
12 inch, 20 ply, 64/68, cloth	base,	$90.55
14 " 20 " 64/68, "	"	112.60
12 " 20 " 84/92, "	"	105.65
14 " 20 " 84/92, "	"	142.35
Sewed buffs, per pound		
Bleached and unbleached	"	1.15

FELT WHEELS

			Price Per Lb.
White Spanish—			
Diameter— 8" to over 16"	Thickness—½" and ¾"		$4.00
" 8"	" 1" to 3"		3.35
" 10" to 16"	" 1" to 3"		3.25
" over 16"	" 1" to 3"		3.35
" 8" to over 16"	" over 3"		3.40
Grey Mexican—			
Diameter— 8" to over 16"	Thickness—½" and ¾"		$3.90
" 8"	" 1" to 3"		3.25
" 10" to 16"	" 1" to 3"		3.15
" over 16"	" 1" to 3"		3.25
" 8" to over 16"	" over 3"		3.30

Above are even diameters. Odd diameters 50c advance.